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**TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY**

NBSIR 80-1821

**COLLABORATIVE REFERENCE PROGRAM
FOR PAPER**

REPORT NO. 61G



**U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards**

QC
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.U56
80-1821
1980

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

Bursting strength	Smoothness
Tearing strength	Surface pick strength
Tensile breaking strength	K & N ink absorption
Elongation to break	Moisture content
Tensile energy absorption	Opacity
Folding endurance	Blue reflectance (brightness)
Stiffness	Specular gloss, 75°
Air resistance	Thickness
Grammage	Concora (flat crush)
	Ring crush

FKBG-API Containerboard (48 times per year)

Mullen burst of linerboard
Concora test of medium

MCCA Color and Appearance (4 times per year)

Gloss at 60°
Color and color difference

CTS Rubber (4 times per year)

Tensile strength, ultimate elongation and tensile stress
Hardness
Mooney viscosity
Vulcanization properties

ASTM Cement (2 times per year)

Chemical (11 chemical components)
Physical (15 characteristics)

AASHTO Bituminous

Asphalt cement (2 times per year)
Cutbacks (once a year)

NBS Collaborative Reference Programs
A05 Technology Building
National Bureau of Standards
Washington, DC 20234

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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

Report No. 61G

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NBSIR 80-1821

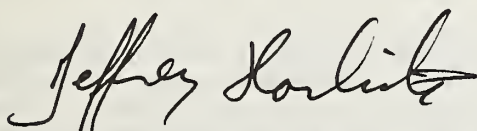
U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 61S and 61G comprise the first set of reports for the 79-80 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Notes and comments to individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 1 of this report for an explanation of "Best Values". Please do not confuse these Best Values with provisional values included with the samples to detect serious discrepancies at the time of test.

If there are any questions on the notes, the analyses, or the reports in general, contact Robert G. Powell or Jeffrey Horlick on 301/921-2946.



Jeffrey Horlick, Administrator
NBS-LAPPI Collaborative Reference Program
Office of Testing Laboratory Evaluation Technology

February 1, 1980

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

Physical Quantity	To Convert From	To	Multiply by
Bursting strength	psi	kPa	6.895
	kg/cm ²	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
Tensile energy absorption	ft-lb/ft ²	J/m ²	14.59
	in.-lb/in. ²	J/m ²	175.1
	kg-m/m ²	J/m ²	9.807
Bending stiffness	g·cm	μN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	μm	25.40

KEY TO TABLES AND GRAPHS

MEAN - The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST N_0) and again at the bottom of this table.

GRAND MEAN - (GR₀ MEAN) The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, #, or *. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.

SD OF MEANS - (SD MEANS) The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.

DEV - The deviation or difference of the laboratory MEAN from the GRAND MEAN.

N₀ DEV - The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N₀ DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.

SDR - The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.

AVERAGE SDR - The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.

R₀ SDR - The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR; an indication of the ability of a participant to repeat his or her measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R₀ SDR should be to unity. If R₀ SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test determinations	Lower limit for R ₀ SDR	Upper limit for R ₀ SDR
-----	-----	-----
3	0.09	2.58
4	0.18	2.25
5	0.26	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR - Code for instrument type or variation in condition, see second table.

F - Flag, with following meaning:

θ - Included in grand mean and inside 95% error ellipse.

* - Included in grand mean but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his or her testing procedure.

X - Excluded because plotted point would fall outside of the 99% error ellipse, (see page 2 for explanation of Graph).

- Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See the notes following Table 1 for each method).

+ - Excluded from grand means because VAR was non-standard for the analysis.

M - Excluded because data for one sample are missing.

S - Included in grand mean but only after omission of one or more 'wild' values; that is test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.

Best values - Given at the end of table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (+/-) limits, when these are shown along with the best values.

COORDINATES - Distances along major and minor axes of error ellipse. If special additive or concurrent model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.

95% ELLIPSE - Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R₀ SDR - Average of the R₀ SDR for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph -

For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45 degrees. The solid sloping line, which may or may not lie close to the 45 degree line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'G'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he or she is following.

The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis, the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis, the graph is not plotted.

The International System of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.

SUMMARY -
(At end of report)

In addition to several quantities already defined above, the summary shows the following values for each test method:

REPL CRP -

The number of replicate test determinations used in this Collaborative Reference Program.

PEPL TAPPI -

The number of replicate test determinations in a test result required by the applicable TAPPI Official Test Method or assumed here if there is no TAPPI Official Test Method. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVERAGE SDP. See TAPPI Official Test Method T1206 for definitions and computations.

REPEAT -

TAPPI repeatability; a measure of the within-laboratory precision of a test result.

REPROD -

TAPPI reproducibility; a measure of the between-laboratory precision of a test result.

ANALYSIS T40-1 TABLE 1
AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
TAPPI OFFICIAL TEST METHOD T400 65-75, AIR RESISTANCE OF PAPER

LAB CODE	SAMPLE A81 90 GRAMS PER SQUARE METER					SAMPLE A22 103 GRAMS PER SQUARE METER					TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L106	20.2	-1.07	-1.05	3.7	1.033	44.4	-1.00	-0.40	3.5	1.12	40D	0	L106
L107	23.1	1.02	0.70	3.0	1.015	45.2	-0.2	-0.09	3.4	1.08	40D	0	L107
L121	21.2	-0.7	-0.44	2.5	0.85	45.3	-2.02	-0.83	2.9	0.92	40D	0	L121
L123	23.8	1.9	1.17	2.9	1.03	45.6	-0.4	-0.16	4.8	1.53	40D	0	L123
L124G	19.2	-2.07	-1.04	3.0	1.07	41.9	-3.5	-1.34	2.0	0.63	40D	0	L124G
L125	23.4	1.0	0.90	2.0	0.84	44.7	-0.7	-0.28	2.3	0.74	40D	0	L125
L128	23.1	1.02	0.70	1.7	0.82	46.5	1.1	0.40	3.2	1.04	40D	0	L128
L141	23.1	1.02	0.70	2.0	0.96	47.4	2.0	0.75	3.4	1.09	40D	0	L141
L148	22.4	0.0	0.00	3.0	1.18	47.7	2.3	0.87	3.0	0.96	40D	0	L148
L153	21.1	-0.3	-0.47	2.7	0.95	44.0	-1.4	-0.55	3.7	1.18	40D	0	L153
L159	19.4	-2.05	-1.49	3.0	1.07	46.5	3.1	1.17	1.6	0.51	40D	*	L159
L163	20.4	-1.05	-0.80	3.0	1.05	47.0	1.5	0.59	2.0	0.64	40D	0	L163
L166	24.8	2.9	1.70	3.4	1.21	49.3	3.9	1.49	4.2	1.35	40D	0	L166
L174	21.9	0.0	0.00	3.0	1.10	45.6	0.4	0.15	3.9	1.27	40D	0	L174
L176	22.3	0.4	0.20	2.0	0.91	45.3	3.8	1.47	6.9	2.20	40D	0	L176
L182G	21.8	-0.1	-0.00	1.7	0.59	41.9	-3.5	-1.35	1.2	0.38	40D	0	L182G
L183	22.7	0.8	0.40	4.4	1.09	45.0	3.6	1.36	4.2	1.33	40D	0	L183
L190C	25.1	3.2	1.90	2.0	0.90	45.8	0.4	0.14	1.5	0.47	40D	0	L190C
L190R	21.7	-0.2	-0.10	3.0	1.09	42.5	-3.0	-1.13	1.9	0.61	40D	0	L190R
L203	23.2	1.4	0.81	3.1	1.10	45.8	4.3	1.66	3.9	1.25	40D	0	L203
L212	19.9	-1.9	-1.17	4.0	1.71	44.2	-1.2	-0.47	4.2	1.34	40D	0	L212
L219	21.5	-0.4	-0.20	2.0	0.76	45.3	-2.1	-0.82	2.5	0.79	40D	0	L219
L223	23.0	1.1	0.80	3.0	1.13	46.1	2.7	1.02	3.3	1.07	40D	0	L223
L228	23.8	1.9	1.14	2.0	0.70	45.2	3.8	1.44	1.6	0.50	40D	0	L228
L230G	22.6	0.7	0.40	2.0	1.00	47.9	2.5	0.94	4.3	1.36	40D	0	L230G
L241	17.7	-4.02	-2.00	2.0	0.81	40.2	-5.02	-1.99	1.7	0.53	40D	*	L241
L242	22.7	0.8	0.40	2.9	1.02	44.1	-1.3	-0.51	3.2	1.02	40D	0	L242
L254	19.8	-2.00	-1.20	1.0	0.66	40.9	1.5	0.56	3.1	1.01	40D	0	L254
L259	21.2	-0.0	-0.00	2.4	0.84	42.9	-2.5	-0.97	3.1	1.00	40D	0	L259
L261	21.2	-0.0	-0.00	2.1	0.70	45.7	0.2	0.08	3.9	1.26	40D	0	L261
L262G	23.4	1.6	0.94	1.4	0.51	46.3	0.8	0.32	2.8	0.91	40D	0	L262G
L265	21.4	-0.5	-0.31	1.0	0.66	45.6	0.4	0.14	2.7	0.87	40D	0	L265
L278	22.6	1.0	0.60	4.0	1.02	45.6	0.2	0.07	2.5	0.80	40D	0	L278
L285	23.3	1.4	0.84	2.4	0.84	46.6	1.4	0.52	2.8	0.88	40D	0	L285
L301	21.8	-0.1	-0.04	2.0	0.94	47.7	2.3	0.88	3.2	1.03	40D	0	L301
L308	21.1	-0.3	-0.47	2.0	0.92	46.6	1.4	0.52	3.6	1.17	40D	0	L308
L313	19.3	-2.00	-1.00	2.0	0.93	40.2	0.8	0.29	1.8	0.56	40D	0	L313
L320	20.6	-1.03	-0.70	2.0	0.89	55.4	-7.0	-2.69	3.0	0.95	40D	*	L320
L324	23.2	1.3	0.78	3.0	1.00	47.1	1.6	0.62	3.8	1.20	40D	0	L324
L326	22.4	0.5	0.31	3.0	1.17	40.4	1.0	0.37	3.7	1.17	40D	0	L326
L328	20.4	-1.05	-0.80	3.0	1.07	44.0	-1.4	-0.53	4.4	1.41	40D	0	L328
L337	21.0	-0.9	-0.50	1.0	0.50	45.3	-2.1	-0.80	2.3	0.74	40D	0	L337
L339	18.1	-3.68	-2.07	2.0	0.99	56.7	-6.8	-2.59	2.4	0.78	40D	*	L339
L344	21.7	-0.2	-0.11	1.4	0.51	42.4	-3.0	-1.15	2.6	0.82	40D	0	L344
L348	23.6	1.7	1.01	3.0	1.04	47.9	2.5	0.94	2.7	0.87	40D	0	L348
L376	23.8	1.9	1.14	4.0	1.43	47.5	2.0	0.78	2.9	0.91	40D	0	L376
L380	20.9	-1.0	-0.50	2.0	0.63	42.2	-3.2	-1.24	2.2	0.71	40D	0	L380
L388	20.4	-1.05	-0.80	4.4	1.05	48.2	2.6	1.05	2.3	0.74	40D	0	L388
L396M	23.6	3.7	2.00	4.0	1.00	45.3	3.8	1.47	4.5	1.44	40D	0	L396M
L484	19.4	-2.05	-1.00	2.0	0.80	42.7	-2.8	-1.06	3.5	1.11	40D	0	L484
L567	22.0	0.1	0.00	2.4	0.80	44.9	-0.6	-0.21	3.3	1.07	40D	0	L567
L576	21.6	-0.5	-0.10	2.0	1.02	43.5	-1.9	-0.73	2.4	0.77	40D	0	L576
L585	21.7	-0.2	-0.10	1.0	0.09	44.5	-0.9	-0.35	3.2	1.02	40D	0	L585
L597	23.3	1.4	0.80	4.0	1.00	46.0	0.6	0.21	3.8	1.22	40D	0	L597
L616	21.9	0.0	0.00	0.9	0.31	46.2	0.8	0.29	1.1	0.36	40D	0	L616
L636	20.0	-1.9	-1.10	1.0	0.83	42.6	-2.8	-1.08	2.4	0.78	40D	0	L636
L651	15.6	-6.03	-3.00	2.0	1.00	59.0	-6.4	-2.46	2.7	0.87	40D	X	L651
L676	22.1	0.2	0.10	2.0	1.02	48.0	2.6	0.98	2.8	0.91	40D	0	L676
L697	24.0	2.2	1.00	2.0	0.90	45.7	-1.7	-0.65	5.2	1.65	40D	0	L697
L715	23.0	1.1	0.60	2.1	0.74	46.6	1.2	0.45	2.3	0.73	40D	0	L715

GR₀ MEAN = 21.9 GURLEY UNITS

SD MEANS = 1.7 GURLEY UNITS

GRAND MEAN = 45.4 GURLEY UNITS

SD OF MEANS = 2.6 GURLEY UNITS

AVERAGE SDR =

2.0 GURLEY UNITS

AVERAGE SDR =

TEST DETERMINATIONS = 10

59 LABS IN GRAND MEANS

TOTAL NUMBER OF LABORATORIES REPORTING = 62

3

Best values: A81 22.0 ± 2.4 Gurley units

K22 45.3 ± 3.9 Gurley units

40U * L115

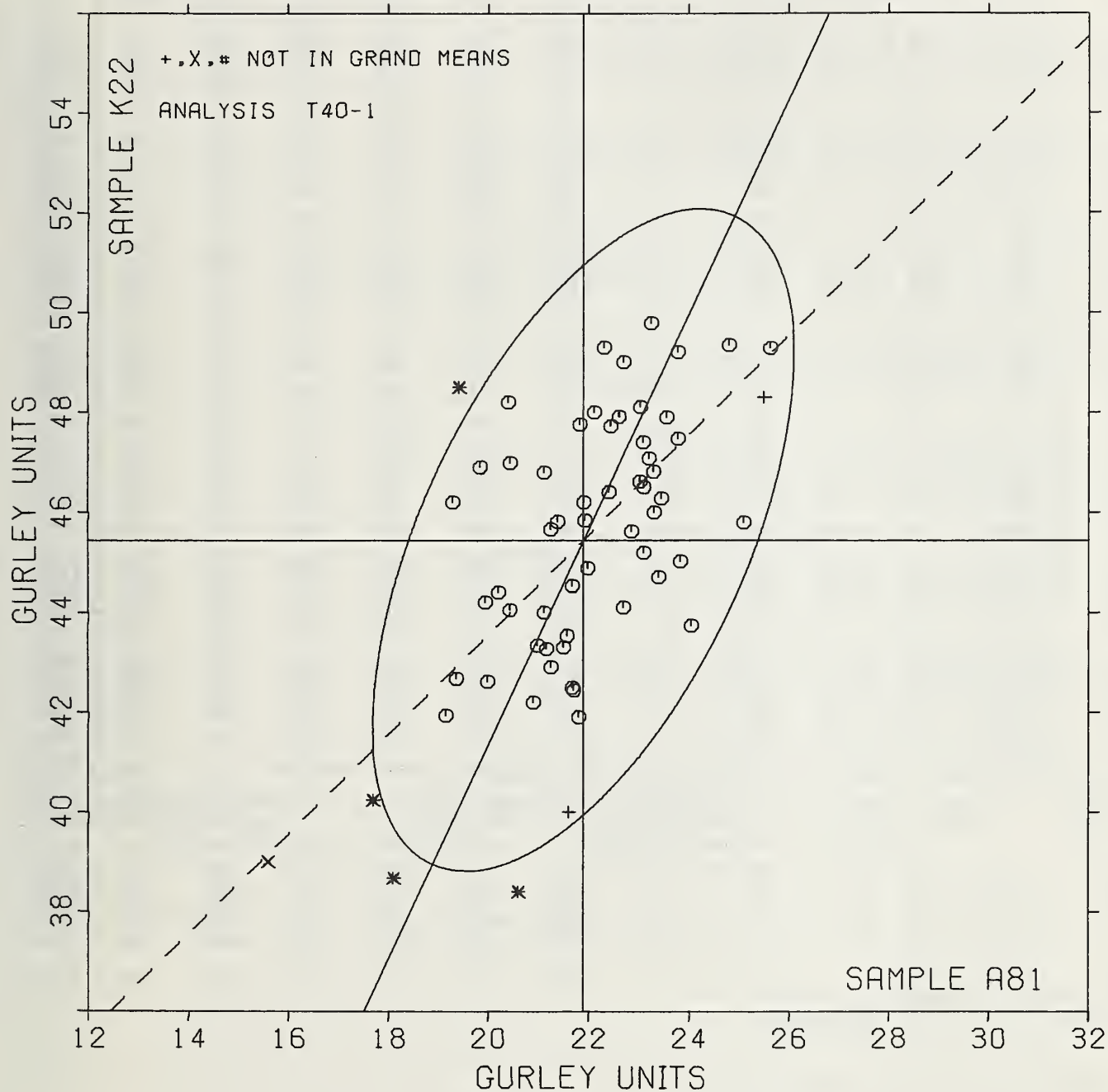
40U * L291

ANALYSIS T40-1 TABLE 2
 AIR RESISTANCE, GURLEY UNITS (SECONDS/100 CC)
 TAPPI OFFICIAL TEST METHOD T400 CS-75, AIR RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS			
		A81	K22	MAJOR	MINOR	MAJOR	VAR				
L651	X	1500	3900	-800	300	003	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L241	*	1707	4002	-000	100	007	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L339	*	1801	3807	-707	06	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L124G	#	1502	4109	-403	100	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L313	#	1503	4602	-004	207	074	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L484	#	1504	4207	-300	101	000	400	AIR RESISTANCE,	REGMED-TYPE GURLEY	DENSOMETER	-OIL FLOTATION
L159	*	1504	4805	107	305	079	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L254	#	1508	4609	00	205	003	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L212	#	1509	4402	-100	102	1002	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L630	#	2000	4206	-304	05	070	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L106	#	2002	4404	-107	101	1003	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L388	#	2004	4802	109	200	1015	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L163	#	2004	4700	00	200	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L328	#	2004	4400	-100	07	1000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L320	*	2000	3804	-100	-108	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L380	#	2009	4202	-304	-05	077	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L337	#	2100	4303	-200	-01	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L308	#	2101	4608	09	103	1004	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L153	#	2101	4400	-100	01	1000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L121	#	2102	4303	-200	-03	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L261	#	2102	4507	-001	07	1001	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L259	#	2102	4209	-200	-05	002	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L265	#	2104	4508	01	06	070	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L219	#	2105	4303	-201	-00	070	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L576	#	2106	4305	-100	-05	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L115	*	2106	4000	-001	-200	003	400	AIR RESISTANCE,	SHEFFIELD IN GURLEY UNITS		
L190R	#	2107	4205	-208	-100	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L585	#	2107	4405	-09	-02	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L344	#	2107	4204	-208	-101	007	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L182G	#	2108	4109	-300	-104	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L301	#	2108	4707	201	100	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L616	#	2109	4602	07	03	004	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L174	#	2109	4508	04	01	1001	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L567	#	2200	4409	-00	-03	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L676	#	2201	4600	204	09	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L176	#	2203	4903	307	102	1000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L326	#	2204	4604	101	-01	1007	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L148	#	2204	4707	200	05	1007	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L230G	#	2206	4709	200	04	1008	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L242	#	2207	4401	-00	-103	1002	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L183	#	2207	4900	300	08	1000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L278	#	2208	4506	00	-08	1001	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L715	#	2300	4606	100	-05	070	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L223	#	2300	4801	200	01	1000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L141	#	2301	4704	203	-03	1004	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L107	#	2301	4502	03	-102	1001	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L128	#	2301	4605	100	-07	003	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L324	#	2302	4701	200	-00	1003	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L203	#	2302	4908	400	00	1016	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L285	#	2303	4608	100	-07	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L597	#	2303	4600	101	-100	1000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L125	#	2304	4407	-00	-107	070	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L262G	#	2304	4603	100	-101	071	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L348	#	2306	4709	200	-05	1001	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L376	#	2308	4705	200	-09	1017	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L228	#	2308	4902	402	-01	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L123	#	2308	4500	04	-109	1006	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L697	#	2400	4307	-00	-207	1007	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L166	#	2408	4903	400	-100	1008	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L190C	#	2501	4508	107	-208	000	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
L291	*	2505	4803	401	-001	000	400	AIR RESISTANCE,	SHEFFIELD IN GURLEY UNITS		
L396M	#	2506	4903	501	-108	1004	400	AIR RESISTANCE,	GURLEY	DENSOMETER	- OIL FLOTATION
GMEANS:		2109	4504			1000					
95% ELLIPSE:				702	302			WALL GAMMA = 65 DEGREES			

AIR RESISTANCE, GURLEY

SAMPLE A81 = 21.9 GURLEY UNITS SAMPLE K22 = 45.4 GURLEY UNITS



ANALYSIS T40-2 TABLE 1

AIR RESISTANCE, SHEFFIELD UNITS (CC/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE
TAPPI USFOL TEST METHOD ON S24, POROSITY BY RESISTANCE TO AIRFLOW

LAB CODE	SAMPLE A81	SAMP. ENVELOPE				SAMPLE K22	PRINTING				TEST D ₀ = 10		
	MEAN	90 GRAMS PER SQUARE METER DEV	PER SQUARE METER NO. DEV	SDR	R ₀ SDR	MEAN	103 GRAMS PER SQUARE METER DEV	PER SQUARE METER NO. DEV	SDR	R ₀ SDR	VAR	F	LAB
L114	137.8	3.0	0.30	8.9	0.65	66.5	7.4	0.97	3.6	0.71	40S	θ	L114
L121	154.0	19.8	1.980	12.0	0.92	92.5	13.4	1.76	4.9	0.96	40S	θ	L121
L122S	142.4	8.2	0.81	14.0	1.13	99.3	20.2	2.66	12.6	2.50	40S	*	L122S
L124S	138.3	4.1	0.44	10.4	1.26	78.8	7.3	0.94	2.6	0.52	40S	θ	L124S
L132	131.2	-3.0	-0.29	10.0	1.23	74.3	-4.8	-0.64	3.7	0.72	40S	θ	L132
L148	143.4	9.2	0.31	15.0	1.10	60.8	1.7	0.22	3.6	0.72	40S	θ	L148
L150	144.7	10.5	1.04	21.0	1.06	76.8	-2.3	-0.31	6.7	1.33	40S	θ	L150
L157	120.5	-13.7	-1.030	9.0	0.74	75.5	-3.6	-0.48	5.0	0.99	40S	θ	L157
L158	132.5	-1.7	-0.17	12.3	0.95	77.5	-1.6	-0.21	5.9	1.17	40S	θ	L158
L190C	137.5	3.3	0.33	18.9	1.46	63.0	3.9	0.51	4.2	0.94	40S	θ	L190C
L213	130.1	1.9	0.19	17.0	1.36	74.5	-4.6	-0.61	3.1	0.61	40S	θ	L213
L223	132.1	-2.1	-0.21	20.0	1.59	70.2	-8.9	-1.18	4.0	0.80	40S	θ	L223
L230S	154.9	20.7	2.070	18.0	1.39	127.3	48.2	6.35	4.6	0.91	40S	#	L230S
L233	119.9	-14.3	-1.43	9.0	0.74	74.7	-4.4	-0.58	3.6	0.71	40S	θ	L233
L241	140.3	6.1	0.61	18.0	1.42	86.9	9.8	1.29	6.1	1.20	40S	θ	L241
L249	127.8	-6.4	-0.64	8.0	0.62	76.9	-2.2	-0.29	4.3	0.84	40S	θ	L249
L260	131.1	-3.1	-0.31	15.8	1.22	78.5	-0.6	-0.08	5.2	1.03	40S	θ	L260
L262S	130.4	-3.4	-0.34	3.8	0.30	79.3	0.2	0.02	4.1	0.82	40S	θ	L262S
L288	142.7	8.5	0.84	14.9	1.15	67.0	7.9	1.04	7.3	1.46	40S	θ	L288
L301	143.5	9.3	0.32	14.2	1.10	65.5	6.4	0.84	13.4	2.66	40S	θ	L301
L315	117.5	-16.7	-1.670	13.2	1.02	61.5	-17.6	-2.32	4.7	0.94	40S	θ	L315
L318	117.6	-16.6	-1.660	8.2	0.83	75.3	-3.8	-0.50	4.2	0.84	40S	θ	L318
L352	144.5	10.3	1.03	13.7	1.06	61.7	2.6	0.34	4.5	0.89	40S	θ	L352
L354	134.8	0.6	0.06	12.0	0.92	78.3	-0.8	-0.11	6.3	1.24	40S	θ	L354
L360	135.1	0.9	0.09	14.3	1.10	75.5	-3.6	-0.48	3.8	0.75	40S	θ	L360
L390	134.0	-0.2	-0.02	11.0	0.85	77.5	-1.6	-0.21	6.8	1.34	40S	θ	L390
L562	156.0	21.8	2.180	11.0	0.90	56.0	18.9	2.49	6.4	1.27	40S	θ	L562
L575	147.6	13.4	1.340	13.2	1.02	78.8	-0.3	-0.04	5.1	1.01	40S	θ	L575
L585	122.5	-11.7	-1.170	5.9	0.45	78.0	-1.1	-0.15	3.5	0.69	40S	θ	L585
L597	135.4	1.2	0.12	20.9	1.01	73.3	-5.8	-0.77	4.8	0.95	40S	θ	L597
L600	129.1	-5.1	-0.51	8.4	0.49	72.5	-6.2	-0.82	5.1	1.02	40S	θ	L600
L626	114.4	-19.8	-1.980	7.7	0.60	73.3	-5.8	-0.77	3.9	0.76	40S	θ	L626
L684	131.9	-2.3	-0.23	14.0	1.13	74.7	-4.4	-0.58	4.7	0.92	40S	θ	L684
L687	132.9	-1.3	-0.13	13.0	1.00	78.1	-1.0	-0.14	4.8	0.95	40S	θ	L687
L698	122.4	-11.8	-1.180	8.3	0.64	73.6	-6.1	-0.81	6.9	1.36	40S	θ	L698
L704	133.0	-1.2	-0.12	10.2	1.25	NO DATA REPORTED FOR SAMPLE K22					40S	N	L704
GR ₀ MEAN = 134.2 SHEFF. UNITS GRAND MEAN = 79.1 SHEFF. UNITS TEST DETERMINATIONS = 10													
SD MEANS = 10.1 SHEFF. UNITS SD OF MEANS = 7.6 SHEFF. UNITS 34 LABS IN GRAND MEANS													
AVERAGE SDR = 13.0 SHEFF. UNITS AVERAGE SDR = 5.0 SHEFF. UNITS													
L182B	580.0	445.8	44.58	63.2	4.08	278.0	198.9	26.23	14.2	2.81	40B	*	L182B
L280	328.7	154.0	15.40	24.0	1.89	129.0	49.9	6.58	9.3	1.85	40B	*	L280
L312	121.2	-13.0	-1.30	0.2	0.46	61.7	2.6	0.34	4.3	0.86	40T	*	L312
L333	608.8	474.6	47.46	99.0	7.68	254.0	174.9	23.06	12.4	2.46	40B	*	L333
L484	575.0	440.8	44.08	63.0	4.90	275.0	195.9	25.83	25.5	5.05	40B	*	L484
L587	124.5	-9.7	-0.97	5.0	0.38	60.0	6.9	0.91	5.2	1.02	40T	*	L587
TOTAL NUMBER OF LABORATORIES REPORTING = 42													
Best values: A81 134 ± 15 Sheffield units													
K22 78 ± 15 Sheffield units													

The following laboratories were omitted from the grand means because of extreme test results: 230S.

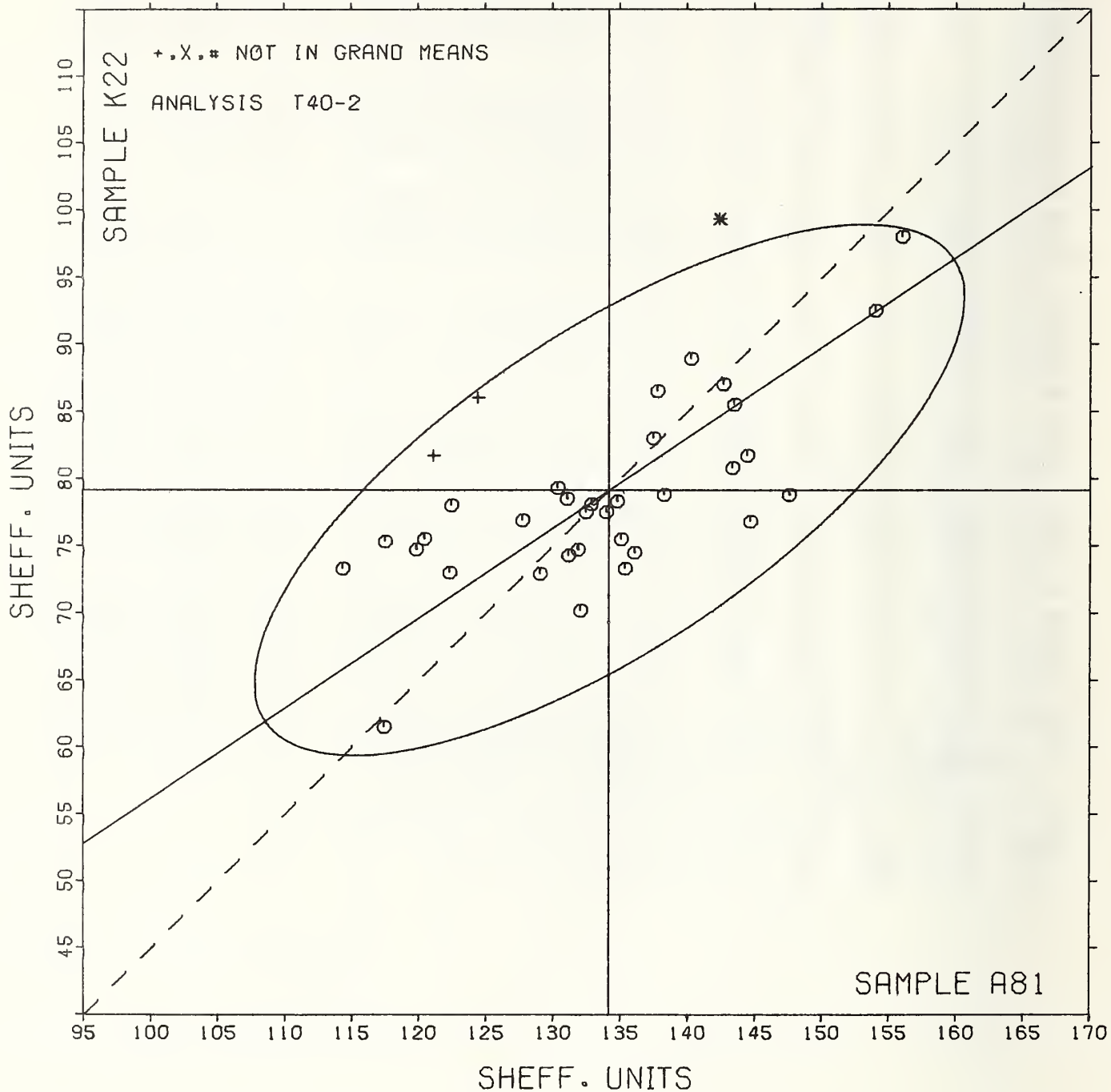
ANALYSIS T40-2 TABLE 2

AIR RESISTANCE, SHEFFIELD UNITS (CO/MIN) FOR 0.442 SQ. IN (3/4 IN. DIA) ORIFICE
TAPPI USFOT TEST METHOD UM 524, POROSITY BY RESISTANCE TO AIRFLOW

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS		
		A81	K22	MAJOR	MINOR	40.50K	VAR			
L626	Ø	114.4	73.3	-19.7	0.2	0.05	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L315	Ø	117.5	61.5	-23.7	-5.3	0.90	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L318	Ø	117.0	75.3	-15.9	0.1	0.73	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L233	Ø	119.9	74.7	-14.3	4.3	0.72	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L157	Ø	120.5	75.5	-13.4	4.0	0.07	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L312	*	121.2	81.7	-9.5	9.4	0.07	40T	AIR RESISTANCE,	SHEFFIELD (3 INCH DIAMETER ORIFICE)	
L698	Ø	122.4	73.0	-13.2	1.5	1.00	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L585	Ø	122.5	78.0	-10.5	5.0	0.57	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L587	*	124.5	86.0	-4.2	11.1	0.70	40T	AIR RESISTANCE,	SHEFFIELD (3 INCH DIAMETER ORIFICE)	
L245	Ø	127.8	76.9	-0.5	1.7	0.73	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L600	Ø	129.1	72.9	-7.7	-2.3	0.70	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L262S	Ø	130.4	79.3	-3.0	2.2	0.50	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L260	Ø	131.1	78.5	-2.9	1.2	1.12	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L132	Ø	131.2	74.3	-5.2	-2.3	0.98	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L684	Ø	131.9	74.7	-4.4	-2.4	1.03	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L223	Ø	132.1	70.2	-0.7	-0.3	1.20	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L158	Ø	132.5	77.5	-2.3	-0.4	1.00	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L687	Ø	132.9	78.1	-1.0	-0.1	0.57	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L704	M	133.0				1.25	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L350	Ø	134.0	77.5	-1.1	-1.3	1.09	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L354	Ø	134.8	78.3	0.1	-1.0	1.05	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L360	Ø	135.1	75.5	-1.3	-3.5	0.93	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L597	Ø	135.4	73.3	-2.2	-5.5	1.26	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L213	Ø	136.1	74.5	-1.0	-4.9	0.95	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L190C	Ø	137.5	83.0	4.9	1.4	1.15	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L114	Ø	137.8	86.5	7.1	4.1	0.70	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L124S	Ø	138.3	78.8	3.2	-2.0	0.89	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L241	Ø	140.3	88.9	10.5	4.7	1.01	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L122S	*	142.4	99.3	18.1	12.2	1.01	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L288	Ø	142.7	87.0	11.5	1.8	1.30	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L148	Ø	143.4	80.8	8.0	-3.8	0.94	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L301	Ø	143.5	85.5	11.3	0.1	1.08	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L352	Ø	144.5	81.7	10.0	-3.0	0.57	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L150	Ø	144.7	76.8	7.4	-7.8	1.00	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L575	Ø	147.6	78.8	11.0	-7.8	1.02	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L121	Ø	154.0	92.5	23.9	0.0	0.94	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L230S	#	154.9	127.3	44.1	28.4	1.15	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L562	Ø	156.0	98.0	28.0	3.5	1.08	40S	AIR RESISTANCE,	SHEFFIELD (3/4 INCH DIAMETER ORIFICE)	
L280	*	328.7	129.0	189.3	-07.1	1.07	40S	AIR RESISTANCE,	HENDTSEN, WG 150	
L484	*	575.0	275.0	475.1	-03.3	4.57	40S	AIR RESISTANCE,	HENDTSEN, WG 150	
L182B	*	580.0	278.0	401.0	-05.6	3.04	40S	AIR RESISTANCE,	HENDTSEN, WG 150	
L333	*	608.8	254.0	491.5	-119.6	5.07	40S	AIR RESISTANCE,	HENDTSEN, WG 150	
GMEANS:		134.2	79.1			1.00				
		95% ELLIPSE:		30.8	11.7			W/IN GAMMA = 33 DEGREES		

AIR RESISTANCE, SHEFFIELD

SAMPLE A81 = 134. SHEFF. UNITS SAMPLE K22 = 79. SHEFF. UNITS



ANALYSIS T41-1 TABLE 1
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
DIRECT READING, SEC/10 CC, MERCURY DENSITY

LAB CODE	SAMPLE D06 MEAN	RELEASE CASE No. 60				SAMPLE G11 MEAN	M.F. RELEASE PAPER				TEST D ₀ = 10		
		112 GRAMS PER SQUARE METER	DEV	No. DEV	SDR		70 GRAMS PER SQUARE METER	DEV	No. DEV	SDR	R ₀ SDR	VAR	LAB
L128	160.	-4.	-0.01	10.	0.02	268.	-2.	-0.06	51.	0.62	41G	0	L128
L134	175.	11.	0.01	23.	1.46	323.	53.	1.27	102.	1.23	41G	0	L134
L166M	191.	27.	2.00	27.	1.08	299.	29.	0.69	120.	1.46	41G	0	L166M
L195	154.	-10.	-0.70	10.	0.02	176.	-95.	-2.29	45.	0.55	41G	0	L195
L224	174.	10.	0.77	29.	1.83	313.	43.	1.03	66.	0.80	41G	0	L224
L230	19388.	19224.	1480.27	2104.	131.83	25972.	25701.	621.26	6154.	74.40	41G	#	L230
L259	147.	-18.	-1.00	9.	0.08	239.	-31.	-0.76	62.	0.75	41G	0	L259
L312	162.	-2.	-0.10	13.	0.80	268.	-2.	-0.06	73.	0.88	41G	0	L312
L358	149.	-15.	-1.10	10.	1.02	266.	-5.	-0.12	87.	1.05	41G	0	L358
L557	167.	3.	0.23	10.	0.03	299.	29.	0.69	87.	1.05	41G	0	L557
L574	152.	-12.	-0.03	9.	0.50	230.	-40.	-0.97	99.	1.20	41G	0	L574
L576	172.	7.	0.07	19.	1.10	301.	30.	0.73	85.	1.03	41G	0	L576
L618	2668.	2524.	195.00	590.	02.04	3438.	3167.	76.56	1075.	13.00	41G	#	L618
L697	108.	4.	0.20	17.	1.04	264.	-7.	-0.16	114.	1.38	41G	0	L697

GR. MEAN = 164. SEC/10 CC

GRAND MEAN = 271. SEC/10 CC

TEST DETERMINATIONS = 10

SD MEANS = 13. SEC/10 CC

SD OF MEANS = 41. SEC/10 CC

12 LABS IN GRAND MEANS

AVERAGE SDR = 10. SEC/10 CC

AVERAGE SDR = 83. SEC/10 CC

TOTAL NUMBER OF LABORATORIES PARTICIPATING = 14

Best values: D06 165 ± 20 seconds per 10 cc

G11 270 ± 180 mercury density,
(direct reading)

The values reported here are the time in seconds required for the displacement of 10 ml of air through an area of 1.0 sq. in. of the specimen. The values are not converted to 100ml of air nor to oil density.

Data from the following laboratories appear to be off by a multiplicative factor: 230, 618.

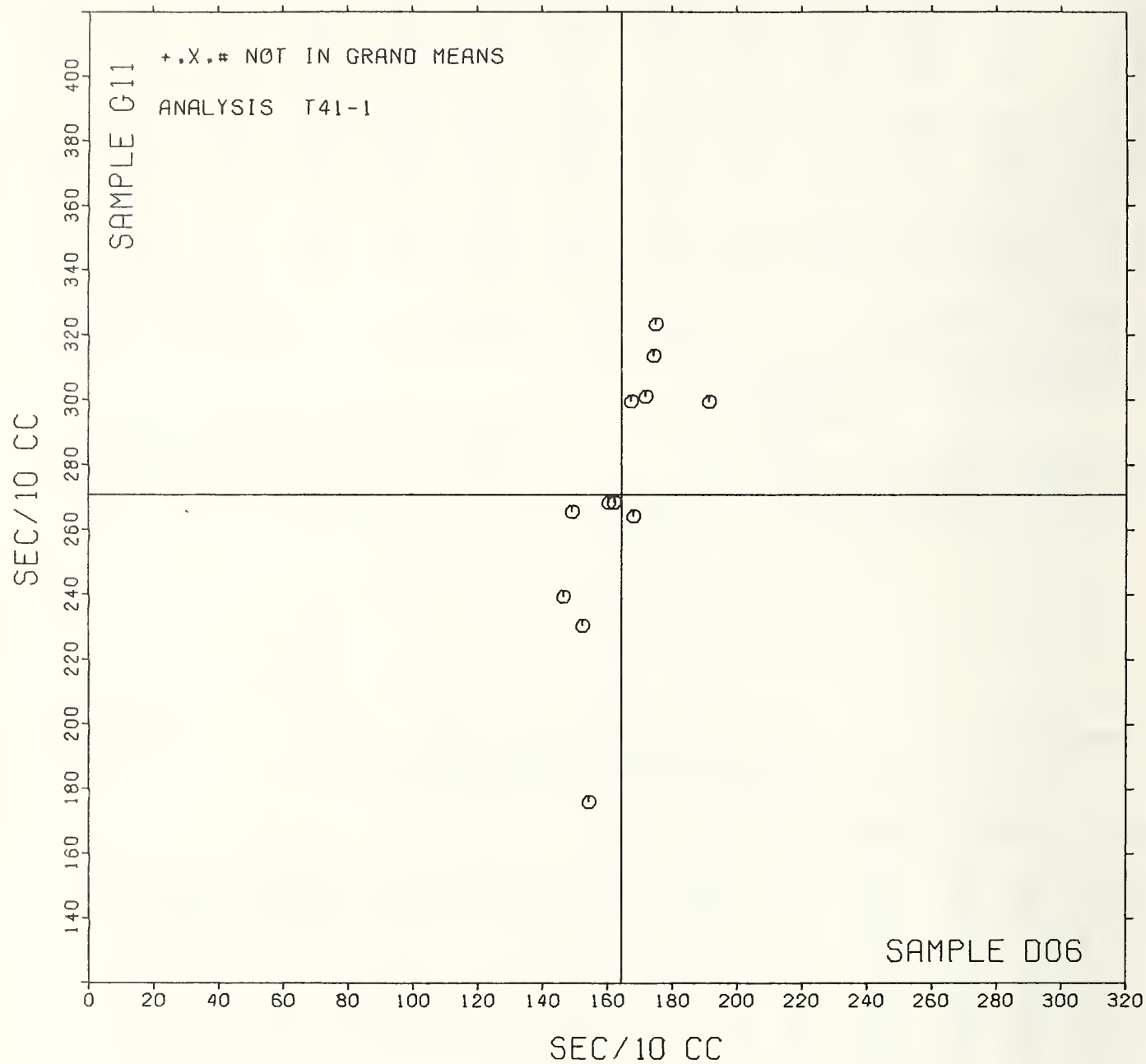
ANALYSIS T41-1 TABLE 2
AIR RESISTANCE, HIGH RANGE, GURLEY MERCURY FLOTATION
DIRECT READING, SEC/10 CC, MERCURY DENSITY

LAB CODE	F	MEANS		COORDINATES		AVG No. SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS						
		D06	G11	MAJOR	MINOR								
L259	0	147.	239.	-30.	10.	0.00	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L358	0	149.	266.	-8.	14.	1.04	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L574	0	152.	230.	-42.	3.	0.08	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L195	0	154.	176.	-95.	-11.	0.00	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L128	0	160.	268.	-3.	3.	0.02	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L312	0	162.	268.	-3.	2.	0.04	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L557	0	167.	299.	29.	4.	0.04	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L697	0	163.	264.	-0.	-5.	1.21	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L576	0	172.	301.	31.	-0.	1.10	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L224	0	174.	313.	44.	-0.	1.01	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L134	0	175.	323.	54.	2.	1.00	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L166M	0	191.	299.	34.	-20.	1.07	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L618	#	2688.	3438.	3653.	-1749.	37.02	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
L230	#	19388.	25972.	29350.	-12970.	100.12	41G	AIR	RESISTANCE,	HIGH RANGE,	GURLEY	MERCURY	FLOTATION
GMEANS:		164.	271.			1.00							
		55% ELLIPSE:	127.	27.		WASH GAMMA = 77 DEGREES							

AIR RESISTANCE, GURLEY HG FLOTATION

SAMPLE D06 = 164. SEC/10 CC

SAMPLE G11 = 271. SEC/10 CC



LAB CODE	SAMPLE J74		PRINTING 76 GRAMS PER SQUARE METER				SAMPLE K46	PRINTING 60 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L122	4.96	.06	1.44	.17	1.11		5.35	.77	1.59	.12	.74	44P	0	L122
L136	4.05	-.31	-.75	.20	1.25		5.44	-.15	-.31	.13	.80	44P	0	L136
L182	4.31	-.06	-.15	.15	.98		5.49	-.10	-.20	.16	.99	44P	0	L182
L288	4.81	.45	1.00	.20	1.31		6.05	.46	.96	.38	2.40	44P	0	L288
L317	4.32	-.04	-.11	.12	.79		5.27	-.32	-.66	.13	.85	44P	0	L317
L588	3.75	-.61	-1.47	.10	1.14		4.91	-.68	-1.41	.12	.76	44P	0	L588
L669	4.34	-.02	-.05	.07	.42		5.60	.01	.03	.07	.45	44P	0	L669
GR ₀ MEAN = 4.36 MICRONS GRAND MEAN = 5.59 MICRONS TEST DETERMINATIONS = 10														
SD MEANS = .42 MICRONS SD OF MEANS = .48 MICRONS 7 LABS IN GRAND MEANS														
AVERAGE SDR = .10 MICRONS AVERAGE SDR = .16 MICRONS														
TOTAL NUMBER OF LABORATORIES PARTICIPATING = 7														
Best values: J74 4.3 microns														
K46 5.5 microns														

LAB CODE	F	MEANS		COORDINATES		AVG R ₀ SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS							
		J74	K46	MAJOR	MINOR									
L588	0	3.75	4.91	-.91	.02	.95 44P	SMOOTHNESS, PARKER PRINTSURF							
L136	0	4.05	5.44	-.32	.14	1.03 44P	SMOOTHNESS, PARKER PRINTSURF							
L182	0	4.31	5.49	-.11	-.02	.96 44P	SMOOTHNESS, PARKER PRINTSURF							
L317	0	4.32	5.27	-.27	-.17	.02 44P	SMOOTHNESS, PARKER PRINTSURF							
L669	0	4.34	5.60	-.00	.02	.44 44P	SMOOTHNESS, PARKER PRINTSURF							
L288	0	4.81	6.05	.04	-.04	1.05 44P	SMOOTHNESS, PARKER PRINTSURF							
L122	0	4.90	6.35	.57	.05	.93 44P	SMOOTHNESS, PARKER PRINTSURF							
GMEANS:		4.36	5.59			1.00								
		95% ELLIPSE:		2.35	.36		WILK GAMMA = 49 DEGREES							

ANALYSIS TAP-1 TABLE 1
SMOOTHNESS, SHEFFIELD UNITS
TAPPI JOSEPH TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	SAMPLE J74	PRINTING 76 GRAMS PER SQUARE METER				SAMPLE K40	PRINTING 60 GRAMS PER SQUARE METER				TEST D ₀ = 15		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAF	F	LAB
L107	130.3	49.5	8.57	10.5	2.14	214.7	47.2	5.97	16.8	1.81	45S	#	L107
L108	78.6	-2.3	-0.44	3.0	0.70	104.0	-3.4	-0.43	3.9	0.42	45S	0	L108
L114	82.6	1.7	0.44	3.9	0.70	170.8	3.4	0.43	8.9	0.96	45S	0	L114
L115	87.0	6.1	1.11	3.2	0.62	103.7	-3.8	-0.48	5.2	0.55	45S	0	L115
L121	85.3	4.5	0.61	4.0	0.94	105.0	-2.4	-0.31	3.8	0.41	45S	0	L121
L122	30.9	0.1	0.01	4.9	0.90	102.3	-5.2	-0.65	6.2	0.67	45S	0	L122
L123	94.7	3.9	0.70	7.2	1.42	108.7	1.3	0.16	10.5	1.13	45S	0	L123
L124	85.3	4.4	0.00	5.9	1.15	105.4	-2.0	-0.26	9.4	1.01	45S	0	L124
L125	78.7	-2.2	-0.40	5.0	1.14	100.0	-1.4	-0.18	6.9	0.74	45S	0	L125
L126	87.6	6.7	1.22	4.4	0.80	171.1	3.6	0.46	7.3	0.78	45S	0	L126
L128	85.5	4.7	0.00	4.5	0.85	105.8	-1.6	-0.21	11.0	1.18	45S	0	L128
L132	80.9	0.1	0.04	10.6	2.00	175.1	7.7	0.97	8.1	0.87	45S	0	L132
L134	78.0	-2.9	-0.52	4.1	0.81	157.3	-10.1	-1.28	4.2	0.45	45S	0	L134
L139S	88.1	7.3	1.32	0.0	1.18	174.0	6.6	0.83	7.6	0.81	45S	0	L139S
L148	83.0	7.1	1.25	4.9	0.95	177.9	10.4	1.32	12.0	1.28	45S	0	L148
L150	75.8	-5.1	-0.52	4.0	0.90	174.5	7.1	0.90	10.5	1.13	45S	0	L150
L152	91.9	11.1	2.01	3.0	0.71	105.3	17.8	2.26	10.7	1.15	45S	0	L152
L153	103.5	22.0	4.10	3.4	0.67	190.3	22.8	2.89	17.7	1.90	45S	X	L153
L157	77.5	-3.4	-0.62	6.9	1.35	171.5	4.0	0.51	10.3	1.10	45S	0	L157
L158	73.3	-7.5	-1.07	5.2	1.03	100.0	-7.4	-0.94	9.3	0.99	45S	0	L158
L159	70.9	-4.0	-0.75	4.5	0.85	106.3	0.8	0.11	7.0	0.75	45S	0	L159
L162	80.5	-0.3	-0.00	5.4	1.05	102.3	-5.2	-0.65	5.0	0.54	45S	0	L162
L166	30.3	-0.5	-0.10	4.5	0.85	151.7	-15.7	-1.99	9.8	1.05	45S	0	L166
L167	91.7	0.0	0.14	3.1	0.61	100.0	-1.4	-0.18	4.7	0.50	45S	0	L167
L183S	77.5	-3.4	-0.62	4.0	0.79	104.2	-3.2	-0.41	10.8	1.16	45S	0	L183S
L190C	85.0	4.1	0.75	5.3	1.05	173.3	5.9	0.75	10.8	1.16	45S	0	L190C
L190R	71.1	-9.0	-1.70	4.0	0.90	101.9	-5.5	-0.70	7.9	0.85	45S	0	L190R
L195	77.5	-3.3	-0.61	0.0	1.17	102.1	-5.4	-0.68	9.3	0.99	45S	0	L195
L203	78.6	-2.3	-0.44	4.0	0.79	100.4	-1.0	-0.13	12.1	1.29	45S	0	L203
L206	83.3	2.5	0.45	4.9	0.95	175.2	5.8	0.73	11.4	1.22	45S	0	L206
L211	79.9	-0.9	-0.17	5.0	0.90	171.7	3.2	0.41	12.2	1.31	45S	0	L211
L213	73.5	-7.4	-1.34	10.4	2.05	151.7	-15.8	-1.99	9.9	1.07	45S	0	L213
L219	96.1	15.2	2.70	4.0	0.90	171.6	4.2	0.53	11.5	1.23	45S	*	L219
L223	75.1	-5.8	-1.05	6.0	1.18	102.6	-4.8	-0.61	10.3	1.11	45S	0	L223
L224	93.5	2.7	0.45	3.9	0.77	104.5	-3.0	-0.38	7.8	0.83	45S	0	L224
L226B	74.5	-6.3	-1.15	4.0	0.79	150.3	-9.2	-1.16	6.6	0.71	45S	0	L226B
L228	91.7	0.8	0.14	4.0	0.95	173.6	6.2	0.78	8.5	0.91	45S	0	L228
L230S	89.9	9.0	1.05	5.4	1.06	107.1	19.6	2.48	13.0	1.39	45S	*	L230S
L231	77.9	-2.9	-0.55	5.0	1.10	100.5	1.0	0.13	12.7	1.36	45S	0	L231
L233	74.8	-6.1	-1.10	6.4	1.27	103.4	-4.0	-0.51	8.9	0.95	45S	0	L233
L237	78.9	-1.9	-0.35	3.5	0.74	174.7	7.2	0.91	6.4	0.69	45S	0	L237
L241	83.7	2.9	0.52	4.0	0.90	153.3	-14.1	-1.78	8.8	0.94	45S	0	L241
L249	78.1	-2.7	-0.50	5.5	1.04	107.3	-0.2	-0.02	9.0	0.96	45S	0	L249
L254	79.4	-1.5	-0.27	3.9	0.76	170.8	3.4	0.43	8.2	0.87	45S	0	L254
L259	89.9	9.1	1.04	7.4	1.40	100.2	18.8	2.37	9.3	1.00	45S	0	L259
L260	80.1	-0.7	-0.15	4.0	0.79	171.6	4.2	0.53	6.7	0.72	45S	0	L260
L261	75.3	-5.0	-1.02	5.0	1.18	100.7	-0.8	-0.10	12.6	1.35	45S	0	L261
L262	94.6	3.7	0.00	4.1	0.81	101.6	-5.8	-0.74	12.7	1.36	45S	0	L262
L275	79.9	-6.0	-1.05	2.4	0.46	104.6	-2.6	-0.33	9.5	1.02	45S	0	L275
L277	87.1	6.3	1.14	8.1	1.50	190.3	22.9	2.90	6.3	0.68	45S	*	L277
L278	95.5	14.7	2.00	7.5	1.40	195.3	27.8	3.52	8.2	0.88	45S	X	L278
L281	75.0	-5.9	-1.00	2.9	0.58	109.7	2.3	0.29	9.8	1.05	45S	0	L281
L285	73.3	-7.6	-1.35	4.0	0.95	157.3	-10.2	-1.29	9.8	1.05	45S	0	L285
L288	73.5	-7.3	-1.35	5.9	1.15	229.7	62.2	7.87	14.8	1.59	45S	#	L288
L290	80.5	-0.4	-0.07	2.7	0.53	157.0	-10.4	-1.32	8.7	0.93	45S	0	L290
L291S	83.5	2.7	0.40	4.1	0.81	100.8	-0.6	-0.08	11.9	1.27	45S	0	L291S
L301	83.5	2.7	0.40	6.7	1.32	100.1	0.6	0.08	9.0	0.97	45S	0	L301
L305	79.1	-1.7	-0.32	5.2	1.02	100.3	-7.1	-0.90	9.8	1.05	45S	0	L305
L308	79.5	-1.4	-0.25	4.0	0.91	102.4	-5.0	-0.64	7.5	0.81	45S	0	L308
L312	88.0	7.1	1.25	6.2	1.22	101.4	-6.0	-0.76	6.3	0.67	45S	0	L312
L317	77.1	-3.0	-0.55	4.0	0.90	159.9	-7.5	-0.95	16.1	1.72	45S	0	L317
L318	73.7	-7.2	-1.35	6.7	1.31	100.8	-3.6	-0.46	8.5	0.91	45S	0	L318
L323	91.3	10.5	1.95	5.5	1.00	170.6	8.6	1.08	10.2	1.09	45S	0	L323
L326	84.3	3.5	0.60	3.5	0.68	100.6	-10.6	-1.35	8.0	0.86	45S	0	L326
L328	70.3	-4.0	-0.64	3.7	0.72	109.7	2.3	0.29	10.4	1.12	45S	0	L328

ANALYSIS T45-1 TABLE 1
SMOOTHNESSES, SHEFFIELD UNITS
TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	SAMPLE J74		PRINTING 76 GRAMS PER SQUARE METER				SAMPLE K46		PRINTING 60 GRAMS PER SQUARE METER				TEST D ₀ = 15		
	MEAN	DEV	NO. DEV	SDR	R ₀ SDR		MEAN	DEV	NO. DEV	SDR	R ₀ SDR	VAP	F	LAB	
L348	82.2	1.3	0.24	5.0	0.98		170.9	3.4	0.43	11.3	1.21	45S	0	L348	
L349	77.0	-3.3	-0.39	0.8	1.34		171.2	3.8	0.48	10.4	1.12	45S	0	L349	
L352	85.9	5.1	0.92	7.0	1.38		173.1	5.7	0.72	12.2	1.31	45S	0	L352	
L360	75.5	-5.4	-0.30	5.1	1.00		168.9	1.4	0.18	11.0	1.18	45S	0	L360	
L366	63.6	-11.3	-2.04	5.9	1.15		140.0	-21.4	-2.71	10.3	1.10	45S	*	L366	
L376	94.3	13.5	2.44	4.0	0.94		170.9	9.5	1.20	9.9	1.06	45S	0	L376	
L380	79.5	-1.3	-0.24	3.9	0.70		169.3	1.9	0.24	9.8	1.05	45S	0	L380	
L382	75.5	-5.4	-0.30	4.0	0.84		164.7	-2.8	-0.35	4.9	0.52	45S	0	L382	
L390	83.0	2.1	0.33	4.0	0.89		168.3	0.9	0.11	7.5	0.80	45S	0	L390	
L562	80.4	-0.5	-0.03	6.3	1.03		174.1	6.6	0.84	6.6	0.70	45S	0	L562	
L567	73.8	-2.1	-0.30	4.7	0.93		164.5	-3.0	-0.38	7.5	0.80	45S	0	L567	
L571	100.7	25.0	4.00	7.0	1.47		207.3	39.9	5.05	13.9	1.49	45S	#	L571	
L575	83.3	2.4	0.43	7.0	1.38		160.7	-1.8	-0.22	8.5	0.92	45S	0	L575	
L585	73.7	-7.2	-1.31	4.0	0.94		170.3	8.9	1.13	18.0	1.93	45S	0	L585	
L587	82.3	1.5	0.27	5.9	1.17		169.3	1.9	0.24	10.8	1.16	45S	0	L587	
L597	75.9	-5.0	-0.31	4.7	0.93		167.7	0.2	0.03	15.2	1.63	45S	0	L597	
L600	82.1	1.3	0.23	4.4	0.86		166.7	-0.8	-0.10	7.4	0.79	45S	0	L600	
L604	70.5	-4.4	-0.00	5.9	1.10		164.3	-3.1	-0.39	13.5	1.44	45S	0	L604	
L626	75.1	-5.8	-1.00	4.7	0.91		167.5	0.1	0.01	9.8	1.05	45S	0	L626	
L636	92.1	11.2	2.00	1.9	0.38		170.0	2.6	0.32	7.5	0.81	45S	0	L636	
L651	86.5	5.7	1.00	4.3	0.85		147.8	-19.6	-2.48	6.9	0.74	45S	X	L651	
L670	84.6	3.7	0.00	5.0	1.10		183.1	15.7	1.99	15.5	1.66	45S	0	L670	
L698	77.3	-3.0	-0.00	5.0	1.02		155.1	-12.4	-1.56	9.9	1.07	45S	0	L698	
L704	79.3	-1.5	-0.20	6.8	1.33		NO DATA REPORTED FOR SAMPLE K46					45S	M	L704	

GR. MEAN = 80.9 SHEFF. UNITS

GRAND MEAN = 167.4 SHEFF. UNITS

TEST DETERMINATIONS = 15

SD MEANS = 5.5 SHEFF. UNITS

SD OF MEANS = 7.9 SHEFF. UNITS

82 LABS IN GRAND MEANS

AVERAGE SDR = 5.1 SHEFF. UNITS

AVERAGE SDR = 9.3 SHEFF. UNITS

TOTAL NUMBER OF LABORATORIES REPORTING = 89

Best values: J74 80 ± 9 Sheffield units

K46 167 ± 12 Sheffield units

The following laboratories were omitted from the
grand means because of extreme test results: 107,
288, 571.

ANALYSIS T45-1 TABLE 2
SMOOTHNESS, SHEFFIELD UNITS
TAPPI USEFUL TEST METHOD UM 518, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J74	K46	MAJOR	MINOR	Δ0.50K	VAR			
L366	#	69.6	146.0	-24.2	0.3	1.13	455	SMOOTHNESS,	SHEFFIELD	
L190R	0	71.1	161.9	-9.4	0.2	0.88	455	SMOOTHNESS,	SHEFFIELD	
L285	0	73.3	157.3	-12.5	2.1	1.00	455	SMOOTHNESS,	SHEFFIELD	
L158	0	73.3	160.0	-10.1	3.3	1.01	455	SMOOTHNESS,	SHEFFIELD	
L213	0	73.5	151.7	-17.4	0.0	1.00	455	SMOOTHNESS,	SHEFFIELD	
L288	#	73.5	229.7	22.0	34.9	1.37	455	SMOOTHNESS,	SHEFFIELD	
L585	0	73.7	176.3	4.0	10.5	1.44	455	SMOOTHNESS,	SHEFFIELD	
L318	0	73.7	163.8	-6.5	4.8	1.11	455	SMOOTHNESS,	SHEFFIELD	
L226B	#	74.5	158.3	-11.0	1.5	0.75	455	SMOOTHNESS,	SHEFFIELD	
L233	0	74.8	163.4	-6.4	3.0	1.11	455	SMOOTHNESS,	SHEFFIELD	
L275	0	74.9	164.8	-5.1	4.1	0.74	455	SMOOTHNESS,	SHEFFIELD	
L281	0	75.0	169.7	-0.0	0.3	0.81	455	SMOOTHNESS,	SHEFFIELD	
L626	0	75.1	167.5	-2.0	5.2	0.55	455	SMOOTHNESS,	SHEFFIELD	
L223	0	75.1	162.6	-7.0	3.0	1.14	455	SMOOTHNESS,	SHEFFIELD	
L261	0	75.3	166.7	-3.2	4.6	1.26	455	SMOOTHNESS,	SHEFFIELD	
L382	0	75.5	164.7	-4.9	3.0	0.88	455	SMOOTHNESS,	SHEFFIELD	
L360	0	75.5	168.5	-1.2	3.5	1.00	455	SMOOTHNESS,	SHEFFIELD	
L150	0	75.8	174.5	4.0	7.0	1.01	455	SMOOTHNESS,	SHEFFIELD	
L597	0	75.9	167.7	-2.1	4.0	1.28	455	SMOOTHNESS,	SHEFFIELD	
L328	0	76.3	169.7	-0.1	5.1	0.2	455	SMOOTHNESS,	SHEFFIELD	
L604	0	76.5	164.3	-4.8	2.5	1.30	455	SMOOTHNESS,	SHEFFIELD	
L159	0	76.9	168.3	-1.1	3.9	0.80	455	SMOOTHNESS,	SHEFFIELD	
L317	0	77.1	159.5	-8.4	0.0	1.01	455	SMOOTHNESS,	SHEFFIELD	
L658	0	77.3	155.1	-12.7	-2.4	1.04	455	SMOOTHNESS,	SHEFFIELD	
L157	0	77.5	171.5	2.0	4.9	1.23	455	SMOOTHNESS,	SHEFFIELD	
L183S	0	77.5	164.2	-4.4	1.6	0.57	455	SMOOTHNESS,	SHEFFIELD	
L195	0	77.5	162.1	-6.5	0.5	1.08	455	SMOOTHNESS,	SHEFFIELD	
L349	0	77.6	171.2	1.9	4.0	1.23	455	SMOOTHNESS,	SHEFFIELD	
L231	0	77.9	168.5	-0.4	3.1	1.23	455	SMOOTHNESS,	SHEFFIELD	
L134	0	78.0	157.3	-10.3	-2.1	0.3	455	SMOOTHNESS,	SHEFFIELD	
L249	0	78.1	167.3	-1.4	2.4	1.00	455	SMOOTHNESS,	SHEFFIELD	
L108	0	78.6	164.0	-4.1	0.5	0.50	455	SMOOTHNESS,	SHEFFIELD	
L203	0	78.6	166.4	-2.0	1.5	1.04	455	SMOOTHNESS,	SHEFFIELD	
L125	0	78.7	166.0	-2.3	1.3	0.74	455	SMOOTHNESS,	SHEFFIELD	
L567	#	78.8	164.5	-3.0	0.5	0.07	455	SMOOTHNESS,	SHEFFIELD	
L237	0	78.9	174.7	3.0	5.0	0.71	455	SMOOTHNESS,	SHEFFIELD	
L305	0	79.1	160.3	-7.1	-1.7	1.13	455	SMOOTHNESS,	SHEFFIELD	
L704	M	79.3				1.03	455	SMOOTHNESS,	SHEFFIELD	
L254	0	79.4	170.8	2.3	2.8	0.02	455	SMOOTHNESS,	SHEFFIELD	
L308	0	79.5	162.4	-5.1	-1.0	0.00	455	SMOOTHNESS,	SHEFFIELD	
L380	0	79.5	169.3	1.1	2.1	0.71	455	SMOOTHNESS,	SHEFFIELD	
L211	0	79.9	170.7	2.4	2.3	1.14	455	SMOOTHNESS,	SHEFFIELD	
L260	0	80.1	171.6	3.4	2.0	0.75	455	SMOOTHNESS,	SHEFFIELD	
L166	0	80.3	151.7	-14.2	0.7	0.55	455	SMOOTHNESS,	SHEFFIELD	
L562	0	80.4	174.1	5.7	3.4	1.10	455	SMOOTHNESS,	SHEFFIELD	
L290	#	80.5	157.0	-9.5	-4.4	0.73	455	SMOOTHNESS,	SHEFFIELD	
L162	0	80.5	162.3	-4.8	-2.1	0.80	455	SMOOTHNESS,	SHEFFIELD	
L122	0	80.9	162.3	-4.0	-2.4	0.81	455	SMOOTHNESS,	SHEFFIELD	
L132	0	80.9	175.1	0.9	3.5	1.47	455	SMOOTHNESS,	SHEFFIELD	
L167	0	81.7	166.0	-0.7	-1.4	0.50	455	SMOOTHNESS,	SHEFFIELD	
L228	0	81.7	173.6	5.8	2.1	0.73	455	SMOOTHNESS,	SHEFFIELD	
L600	0	82.1	166.7	-0.1	-1.5	0.82	455	SMOOTHNESS,	SHEFFIELD	
L348	0	82.2	170.9	3.7	0.4	1.09	455	SMOOTHNESS,	SHEFFIELD	
L587	0	82.3	169.3	2.4	-0.4	1.15	455	SMOOTHNESS,	SHEFFIELD	
L114	0	82.6	170.8	3.0	-0.0	0.00	455	SMOOTHNESS,	SHEFFIELD	
L390	0	83.0	168.3	1.0	-1.5	0.85	455	SMOOTHNESS,	SHEFFIELD	
L575	0	83.3	165.7	-0.5	-2.9	1.15	455	SMOOTHNESS,	SHEFFIELD	
L206	0	83.3	173.2	0.5	0.4	1.09	455	SMOOTHNESS,	SHEFFIELD	
L301	0	83.5	168.1	1.0	-2.1	1.14	455	SMOOTHNESS,	SHEFFIELD	
L224	#	83.5	164.5	-1.4	-3.7	0.80	455	SMOOTHNESS,	SHEFFIELD	
L291S	0	83.5	166.8	0.0	-2.7	1.04	455	SMOOTHNESS,	SHEFFIELD	
L241	0	83.7	153.3	-11.2	-9.0	0.52	455	SMOOTHNESS,	SHEFFIELD	
L326	#	84.3	156.8	-7.9	-7.9	0.77	455	SMOOTHNESS,	SHEFFIELD	
L670	0	84.6	183.1	15.7	3.8	1.38	455	SMOOTHNESS,	SHEFFIELD	
L262	0	84.6	161.6	-3.5	-0.0	1.09	455	SMOOTHNESS,	SHEFFIELD	

ANALYSIS T45-1 TABLE 2

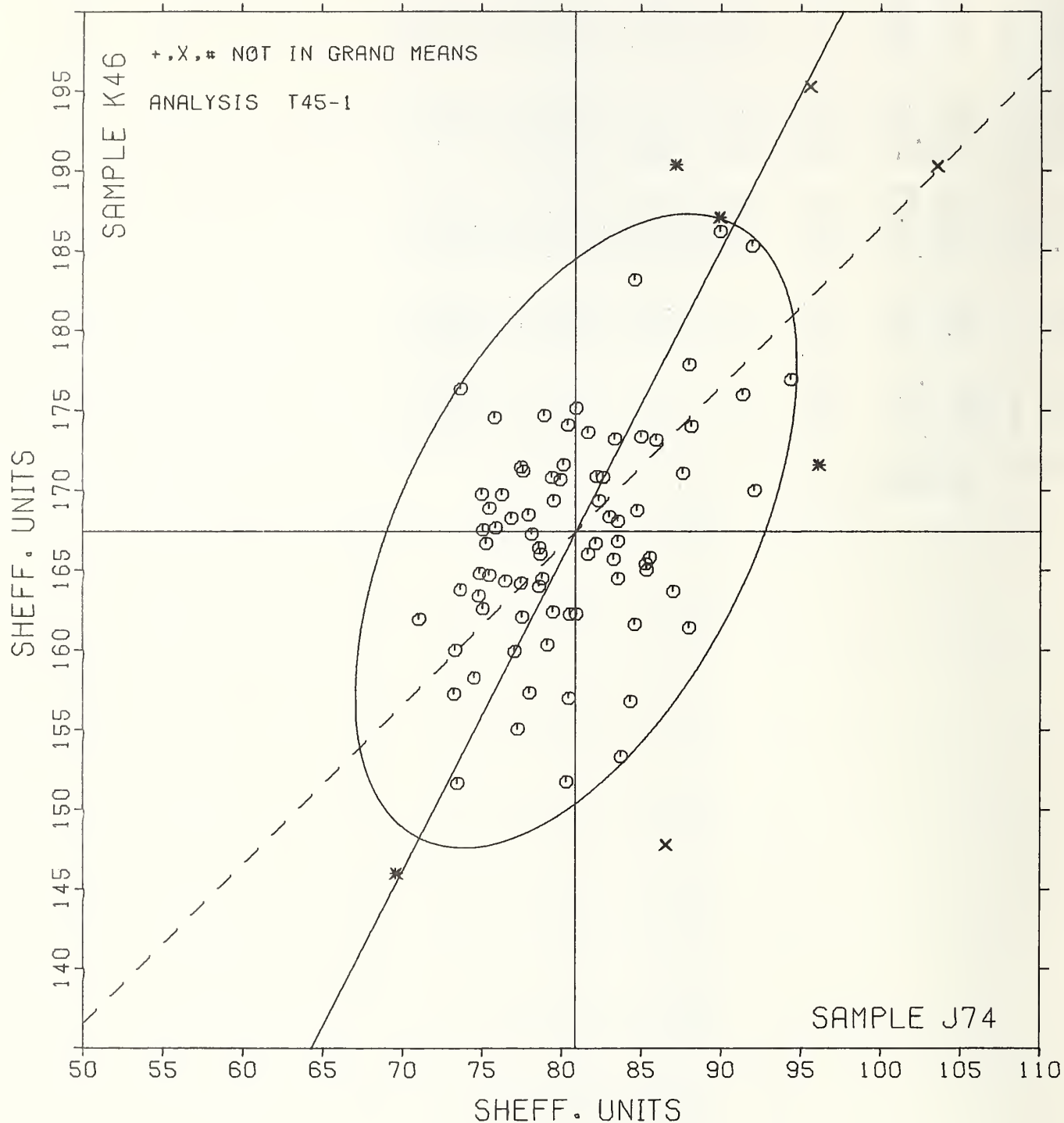
SMOOTHNESS, SHEFFIELD UNITS

TAPPI USEFUL TEST METHOD UM 516, SMOOTHNESS OF PAPER (SHEFFIELD)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERLY---	TEST INSTRUMENT---	CONDITIONS
		J74	K46	MAJOR	MINOR	ROTOR	VAL			
L123	Ø	84.7	168.7	2.9	-2.8	1.27	455	SMOOTHNESS,	SHEFFIELD	
L190C	Ø	85.0	173.3	7.1	-1.0	1.10	455	SMOOTHNESS,	SHEFFIELD	
L124	Ø	85.3	165.4	.2	-4.8	1.08	455	SMOOTHNESS,	SHEFFIELD	
L121	Ø	85.3	165.0	-.1	-5.1	.07	455	SMOOTHNESS,	SHEFFIELD	
L128	Ø	85.5	165.8	.7	-4.9	1.01	455	SMOOTHNESS,	SHEFFIELD	
L352	Ø	85.9	173.1	7.4	-1.9	1.34	455	SMOOTHNESS,	SHEFFIELD	
L651	X	86.5	147.8	-14.9	-14.0	.79	455	SMOOTHNESS,	SHEFFIELD	
L115	Ø	87.0	163.7	-.0	-7.2	.59	455	SMOOTHNESS,	SHEFFIELD	
L277	*	87.1	190.3	23.2	4.9	1.13	455	SMOOTHNESS,	SHEFFIELD	
L126	Ø	87.6	171.1	0.5	-4.3	.02	455	SMOOTHNESS,	SHEFFIELD	
L148	Ø	88.0	177.9	12.5	-1.0	1.12	455	SMOOTHNESS,	SHEFFIELD	
L312	Ø	88.0	161.4	-2.1	-9.1	.55	455	SMOOTHNESS,	SHEFFIELD	
L139S	Ø	88.1	174.0	9.2	-5.5	1.00	455	SMOOTHNESS,	SHEFFIELD	
L230S	*	89.9	187.1	21.0	.9	1.23	455	SMOOTHNESS,	SHEFFIELD	
L259	Ø	89.9	186.2	20.8	.5	1.23	455	SMOOTHNESS,	SHEFFIELD	
L323	Ø	91.3	176.0	12.4	-5.4	1.39	455	SMOOTHNESS,	SHEFFIELD	
L152	Ø	91.9	185.3	20.9	-1.7	.53	455	SMOOTHNESS,	SHEFFIELD	
L636	Ø	92.1	170.0	7.4	-8.8	.00	455	SMOOTHNESS,	SHEFFIELD	
L376	Ø	94.3	176.9	14.0	-7.0	1.00	455	SMOOTHNESS,	SHEFFIELD	
L278	X	95.5	195.3	31.5	-.4	1.17	455	SMOOTHNESS,	SHEFFIELD	
L219	*	96.1	171.6	10.0	-11.6	1.00	455	SMOOTHNESS,	SHEFFIELD	
L153	X	103.5	190.3	30.0	-9.7	1.28	455	SMOOTHNESS,	SHEFFIELD	
L571	#	106.7	207.3	47.5	-4.8	1.48	455	SMOOTHNESS,	SHEFFIELD	
L107	#	130.5	214.7	64.0	-22.5	1.90	455	SMOOTHNESS,	SHEFFIELD	
GMEANS:		86.9	167.4			1.00				
95% ELLIPSE:				21.6	10.9			With GAMMA = 62 DEGREES		

SMOOTHNESS, SHEFFIELD

SAMPLE J74 = 81. SHEFF. UNITS SAMPLE K46 = 167. SHEFF. UNITS



ANALYSIS T45-2 TABLE 1

SMOOTHNESS, BEKK SECONDS

TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CODE	SAMPLE J74		PRINTING 76 GRAMS PER SQUARE METER			SAMPLE K46	PRINTING 60 GRAMS PER SQUARE METER				TEST D ₀ = 15		
	MEAN	DEV	N ₀ DEV	SDR	K ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	K ₀ SDR	VAR	F LAB
L139B	85.2	1.5	3.40	5.00	0.74	25.9	2.8	1.24	3.2	1.11	45K	0	L139B
L162	88.4	4.7	1.23	11.0	1.44	26.6	-0.5	-0.22	3.7	1.30	45K	0	L162
L182K	65.3	-18.4	-4.00	5.1	0.66	26.6	-0.5	-0.23	2.3	0.80	45K	#	L182K
L190C	81.1	-2.0	-0.60	7.8	1.03	26.7	-0.4	-0.17	3.6	1.26	45K	0	L190C
L230B	78.5	-5.2	-1.37	4.3	0.59	23.4	-3.7	-1.67	2.0	0.69	45K	0	L230B
L291K	88.4	4.7	1.24	13.9	1.62	27.8	0.7	0.32	3.3	1.18	45K	0	L291K
L564	85.5	1.8	0.47	0.3	0.83	26.7	1.6	0.73	2.7	0.93	45K	0	L564
L581	79.7	-4.0	-1.07	5.7	0.75	24.7	-2.4	-1.10	1.4	0.51	45K	0	L581
L697	82.7	-0.9	-0.23	6.2	0.81	29.0	1.9	0.86	2.9	1.02	45K	0	L697
GR ₀ MEAN = 83.7 BEKK SECONDS													
SD MEANS = 3.8 BEKK SECONDS													
AVERAGE SDR = 7.0 BEKK SECONDS													
GRAND MEAN = 27.1 BEKK SECONDS													
SD OF MEANS = 2.2 BEKK SECONDS													
AVERAGE SDR = 2.8 BEKK SECONDS													
TEST DETERMINATIONS = 15													
8 LABS IN GRAND MEANS													
L250M	65.3	-18.4	-4.00	4.3	0.56	25.2	-1.9	-0.86	2.4	0.83	45L	*	L250M
L251	74.2	-9.3	-2.31	8.4	1.10	23.5	-3.6	-1.62	1.5	0.54	45L	*	L251
TOTAL NUMBER OF LABORATORIES REPORTING = 11													
Best values: J74 84 Bekk seconds													
K46 27 Bekk seconds													

The following laboratories were omitted from the grand means because of extreme test results: 182K.

ANALYSIS T45-2 TABLE 2

SMOOTHNESS, BEKK SECONDS

TAPPI SUGGESTED METHOD T479 SU-71, SMOOTHNESS OF PAPER (BEKK METHOD)

LAB CODE	F	MEANS		COORDINATES		AVG K ₀ SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS						
		J74	K46	MAJOR	MINOR								
L250M	*	65.3	25.2	-17.0	0.7	0.9	45L	SMOOTHNESS,	BEKK,	20 C,	65% RH		
L182K	#	65.3	26.6	-17.0	7.0	0.3	45K	SMOOTHNESS,	BEKK				
L251	*	74.2	23.5	-10.1	0.0	0.2	45L	SMOOTHNESS,	BEKK,	20 C,	65% RH		
L230B	0	78.5	23.4	-0.2	-1.3	0.4	45K	SMOOTHNESS,	BEKK				
L581	0	79.7	24.7	-4.7	-0.6	0.3	45K	SMOOTHNESS,	BEKK				
L190C	0	81.1	26.7	-2.5	0.7	1.1	45K	SMOOTHNESS,	BEKK				
L697	0	82.7	29.0	-0.1	2.1	0.2	45K	SMOOTHNESS,	BEKK				
L139B	0	85.2	29.9	2.0	1.9	0.2	45K	SMOOTHNESS,	BEKK				
L564	0	85.5	28.7	2.0	0.8	0.8	45K	SMOOTHNESS,	BEKK				
L291K	0	88.4	27.8	4.0	-1.3	1.0	45K	SMOOTHNESS,	BEKK				
L162	0	88.4	26.6	4.1	-2.4	1.0	45K	SMOOTHNESS,	BEKK				
GMEANS:		63.7	27.1			1.0							
95% ELLIPSE:				14.1	0.6								
WITH GAMMA = 23 DEGREES													

SMOOTHNESS, BENDTSEN (MILLILITERS/MINUTE)

TAPPI USEFUL TEST METHOD UM 530, SMOOTHNESS OF PAPER AND PAPERBOARD (BENDTSEN TESTER)

LAB CODE	SAMPLE	PRINTING					SAMPLE	PRINTING					TEST D ₀ = 10		
	J74	76 GRAMS PER SQUARE METER					K46	60 GRAMS PER SQUARE METER					VAP	F	LAB
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDP	R ₀ SDR					
L182B	98.8	2.2	0.22	13.7	1.03	231.5	6.6	0.42	27.3	1.17	47B	0	L182B		
L242	84.4	-12.2	-1.24	0.0	0.71	215.5	-10.4	-0.66	19.2	0.82	47B	0	L242		
L244	93.7	-2.9	-0.29	9.2	1.09	220.5	-3.4	-0.22	28.0	1.20	47B	0	L244		
L280	110.9	14.3	1.43	0.0	0.81	254.0	30.7	1.95	37.2	1.59	47B	0	L280		
L313	91.0	-5.0	-0.50	9.9	1.18	210.0	-7.9	-0.50	17.8	0.76	47B	0	L313		
L333	101.1	4.0	0.40	13.3	1.58	200.0	-17.9	-1.14	26.0	1.11	47B	0	L333		
L484	107.8	11.2	1.12	4.2	0.50	230.0	12.1	0.77	13.5	0.58	47B	0	L484		
L685	85.0	-11.0	-1.10	4.1	0.49	214.0	-9.9	-0.63	18.4	0.78	47B	0	L685		

GR₀ MEAN = 90.6 ML/MIN

GRAND MEAN = 223.9 ML/MIN

TEST DETERMINATIONS = 10

SD MEANS = 9.8 ML/MIN

SD OF MEANS = 15.7 ML/MIN

8 LABS IN GRAND MEANS

AVERAGE SDR = 80.4 ML/MIN

AVERAGE SDR = 23.4 ML/MIN

TOTAL NUMBER OF LABORATORIES REPORTING = 8

Best values: J74 96 milliliter per minute

K46 220 milliliter per minute

SMOOTHNESS, BENDTSEN (MILLILITERS/MINUTE)

TAPPI USEFUL TEST METHOD UM 530, SMOOTHNESS OF PAPER AND PAPERBOARD (BENDTSEN TESTER)

LAB		MEANS		COORDINATES		AVG				
CODE	F	J74	K46	MAJOR	MINOR	R ₀ SDR	VAP	PROPERTY---TEST INSTRUMENT---CONDITIONS		
L242	0	84.4	213.5	-14.9	3.8	377	47B	SMOOTHNESS,	BENDTSEN,	WG 150
L685	0	85.0	214.0	-14.2	3.5	0.3	47B	SMOOTHNESS,	BENDTSEN,	WG 150
L313	0	91.0	216.0	-9.0	1.2	0.7	47B	SMOOTHNESS,	BENDTSEN,	WG 150
L244	0	93.7	220.5	-4.4	0.9	1.14	47B	SMOOTHNESS,	BENDTSEN,	WG 150
L182B	0	98.8	230.5	0.9	1.2	1.40	47B	SMOOTHNESS,	BENDTSEN,	WG 150
L333	0	101.1	206.0	-13.0	-12.5	1.00	47B	SMOOTHNESS,	BENDTSEN,	WG 150
L484	0	107.8	236.0	10.0	-4.1	0.54	47B	SMOOTHNESS,	BENDTSEN,	WG 150
L280	0	110.9	254.0	33.0	2.0	1.20	47B	SMOOTHNESS,	BENDTSEN,	WG 150
GMEANS:		96.0	223.9			1.00				
95% ELLIPSE:				61.0	20.4			WALL GAMMA = 61 DEGREES		

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T53-1 TABLE 1
MOISTURE IN PAPER, PERCENT
TAPPI SUGGESTED METHOD T412 SU-69

SEPTEMBER 1979

LAB CODE	SAMPLE G09		PRINTING 76 GRAMS PER SQUARE METER				SAMPLE G10		BROWN KRAFT 76 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	N ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	N ₀ SDR		VAP	F	LAB
L134	6.32	.40	1.23	.10	1.34		6.36	.19	.39	.05	.68		53M	6	L134
L141	6.24	.32	.90	.05	.71		6.70	.53	1.09	.10	1.32		53D	6	L141
L162	5.46	-.46	-1.42	.13	1.65		5.45	-.72	-1.49	.07	.93		53M	6	L162
L213	5.37	-.55	-1.70	.06	1.07		5.42	-.75	-1.55	.12	1.62		53M	6	L213
L244	5.90	-.02	-.07	.00	.00		6.30	.13	.26	.00	.90		53D	6	L244
L291	6.17	.24	.73	.06	.75		6.63	.66	1.36	.15	2.02		53D	6	L291
L442	5.92	.00	.00	.12	1.55		6.29	.12	.25	.06	.82		53D	6	L442
L570	7.08	1.16	3.57	.93	12.08		5.60	-.57	-1.18	.71	9.36		53D	#	L570
L571	5.93	.01	.02	.03	.63		6.12	-.05	-.11	.08	1.04		53M	6	L571
L592	5.59	.07	.21	.10	1.29		6.08	-.09	-.19	.04	.56		53M	6	L592

GR. MEAN = 5.92 PERCENT

GRAND MEAN = 6.17 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = .32 PERCENT

SD OF MEANS = .48 PERCENT

9 LABS IN GRAND MEANS

AVERAGE SDR = .08 PERCENT

AVERAGE SDR = .08 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 10

Best values: G09 5.9 percent

G10 6.1 percent

The following laboratories were omitted from the
grand means because of extreme test results: 570

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T53-1 TABLE 2
MOISTURE IN PAPER, PERCENT
TAPPI SUGGESTED METHOD T412 SU-69

SEPTEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--	TEST INSTRUMENT--	CONDITIONS
		G09	G10	MAJOR	MINOR	N ₀ SDR	VAP			
L213	6	5.37	5.42	-.93	.06	1.35	53M	MOISTURE	CONTENT,	MOISTFEX
L162	6	5.46	5.45	-.80	-.00	1.29	53M	MOISTURE	CONTENT,	MOISTFEX
L244	6	5.90	6.30	.09	.09	.00	53M	MOISTURE	CONTENT,	OVEN DRYING METHOD
L442	6	5.92	6.29	.10	.06	1.19	53D	MOISTURE	CONTENT,	OVEN DRYING METHOD
L571	6	5.93	6.12	-.04	-.04	.64	53M	MOISTURE	CONTENT,	MOISTFEX
L592	6	5.99	6.08	-.04	-.11	.53	53M	MOISTURE	CONTENT,	MOISTFEX
L291	6	6.17	6.83	.69	.15	1.38	53D	MOISTURE	CONTENT,	OVEN DRYING METHOD
L141	6	6.24	6.70	.02	.02	1.02	53D	MOISTURE	CONTENT,	OVEN DRYING METHOD
L134	6	6.32	6.36	.37	-.23	1.01	53M	MOISTURE	CONTENT,	MOISTFEX
L570	#	7.08	5.60	.13	-1.28	10.72	53D	MOISTURE	CONTENT,	OVEN DRYING METHOD
GMEANS:		5.92	6.17			1.00				
		95% ELLIPSE:		1.88	.38			WIDE GAMMA = 57 DEGREES		

ANALYSIS T50-1 TABLE 1

K & N INK ABSORPTION

TAPPI USEFUL TEST METHOD UM 553, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB CODE	COATED OFFSET BOOK						COATED HEAT SET OFFSET						TEST D ₀ = 4		
	B80 MEAN	75 GRAMS PER SQUARE METER DEV	NO DEV	SDR	R ₀ SDR		B92 MEAN	76 GRAMS PER SQUARE METER DEV	NO DEV	SDR	R ₀ SDR		VAR	F	LAB
L126	24.7	.0	.024	1.01	1.37		23.1	-.7	-.24	.7	.91		56K	0	L126
L149	21.7	-2.2	-.72	.5	.04		21.7	-2.1	-.67	1.3	1.67		56K	0	L149
L182	25.4	1.5	.40	.8	.98		25.1	1.3	.43	.2	.25		56K	0	L182
L277	26.5	2.5	.53	.0	.74		26.0	2.2	.71	.8	1.08		56K	0	L277
L291	19.0	-5.0	-1.01	1.3	1.05		18.3	-5.5	-1.81	.6	.80		56K	0	L291
L333	21.5	-2.5	-.00	1.0	1.29		23.7	-.1	-.02	.5	.66		56K	0	L333
L337	22.3	-1.7	-.34	1.1	1.39		21.1	-2.7	-.88	1.3	1.70		56K	0	L337
L339	30.2	6.3	2.00	.5	.04		29.6	5.8	1.89	.7	.99		56K	0	L339
L616	23.7	-.2	-.00	.5	.04		24.7	.9	.30	.5	.66		56K	0	L616
L643	24.7	.8	.24	.5	.04		24.7	.9	.30	1.0	1.27		56K	0	L643

GR₀ MEAN = 24.0 K & N UNITS

GRAND MEAN = 23.6 K & N UNITS

TEST DETERMINATIONS = 4

SD MEANS = 3.1 K & N UNITS

SD OF MEANS = 3.1 K & N UNITS

10 LABS IN GRAND MEANS

AVERAGE SDR = .0 K & N UNITS

AVERAGE SDR = .8 K & N UNITS

TOTAL NUMBER OF LABORATORIES PARTICIPATING = 10

Best values: B80 25 K & N units

B92 23 K & N units

ANALYSIS T56-1 TABLE 2

K & N INK ABSORPTION

TAPPI USEFUL TEST METHOD UM 553, PRINTING INK METHOD AND BRITISH STANDARD 4574-70

LAB CODE	F	MEANS		COORDINATES		AVG K ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS							
		B80	B92	MAJOR	MINOR										
L291	0	19.0	18.3	-7.5	-.4	1.23	56K	INK	ABSORPTION,	K&N	INK	TEST			
L333	0	21.5	23.7	-1.0	1.7	.97	56K	INK	ABSORPTION,	K&N	INK	TEST			
L149	0	21.7	21.7	-3.1	.1	1.15	56K	INK	ABSORPTION,	K&N	INK	TEST			
L337	0	22.3	21.1	-3.1	-.8	1.54	56K	INK	ABSORPTION,	K&N	INK	TEST			
L616	0	23.7	24.7	.5	.8	.00	56K	INK	ABSORPTION,	K&N	INK	TEST			
L126	0	24.7	23.1	.0	-1.1	1.14	56K	INK	ABSORPTION,	K&N	INK	TEST			
L643	0	24.7	24.7	1.2	.1	.90	56K	INK	ABSORPTION,	K&N	INK	TEST			
L182	0	25.4	25.1	2.0	-.1	.02	56K	INK	ABSORPTION,	K&N	INK	TEST			
L277	0	26.5	26.0	3.3	-.2	.91	56K	INK	ABSORPTION,	K&N	INK	TEST			
L339	0	30.2	29.6	8.5	-.2	.02	56K	INK	ABSORPTION,	K&N	INK	TEST			

GMEANS:

24.0 23.8

1.00

95% ELLIPSE:

13.7

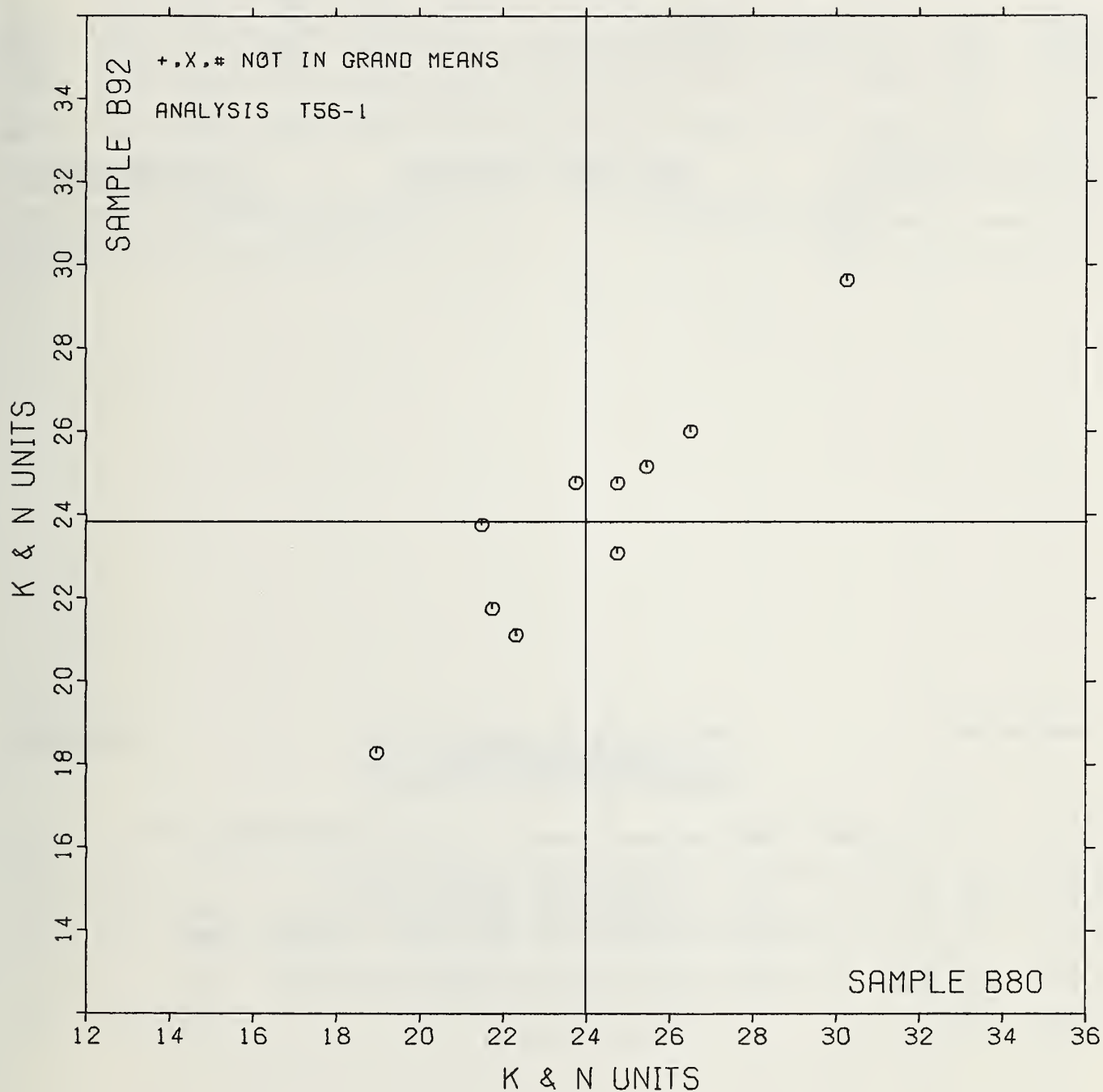
2.5

WASH GAMMA = 44 DEGREES

K & N INK ABSORPTION

SAMPLE B80 = 24.0 K & N UNITS

SAMPLE B92 = 23.8 K & N UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-1 TABLE 1
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI OFFICIAL TEST METHOD T509 6S-77

SEPTEMBER 1979

LAB CODE	SAMPLE A99		REPROCOPY 78 GRAMS PER SQUARE METER				SAMPLE J78		PRINTING 89 GRAMS PER SQUARE METER				TEST D ₀ = 5		
	MEAN	DEV	NO DEV	SDR	NO SDR	MEAN	DEV	NO DEV	SDR	NO SDR	VAR	F	LAB		
L162	5.780	0.051	0.45	0.049	1.019	7.348	0.148	0.38	0.026	0.32	57A	0	L162		
L182C	5.850	0.121	1.000	0.052	1.015	7.380	0.180	0.46	0.047	0.58	57D	0	L182C		
L251C	5.892	0.163	1.045	0.020	0.57	7.034	0.434	1.011	0.024	0.39	57P	0	L251C		
L328	5.630	0.099	0.007	0.045	0.59	7.240	0.040	0.10	0.042	0.52	57M	0	L328		
L356	5.604	0.125	1.010	0.051	1.013	6.742	0.458	1.017	0.032	0.49	57V	0	L356		
L442	5.709	0.020	0.10	0.039	0.55	7.477	0.277	0.71	0.310	3.84	570	0	L442		
L484A	5.640	0.089	0.79	0.055	1.021	6.580	0.620	1.059	0.084	1.04	57Y	0	L484A		
GR. MEAN = 5.729 PH UNITS															
SD MEANS = 0.114 PH UNITS															
AVERAGE SDR = 0.045 PH UNITS															
TOTAL NUMBER OF LABORATORIES REPORTING = 7															
Best values: A99 5.7 pH units															
J78 7.3 pH units															

GRAND MEAN = 7.200 PH UNITS
SD OF MEANS = 0.591 PH UNITS

TEST DETERMINATIONS = 5
7 LABS IN GRAND MEANS

AVERAGE SDR = 0.081 PH UNITS

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-1 TABLE 2
HYDROGEN ION CONCENTRATION (PH), COLD
TAPPI OFFICIAL TEST METHOD T509 6S-77

SEPTEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS							
		A99	J78	MAJOR	MINOR	NO SDR	VAR								
L356	0	5.604	6.742	0.475	0.020	0.70	57V PH, COLD, BECKMAN EXPANDOMATIC								
L328	0	5.630	7.240	0.017	0.100	0.70	57M PH, COLD, BECKMAN ZEROMATIC								
L484A	0	5.640	6.580	0.024	0.052	1.012	57Y PH, COLD, BECKMAN MODEL H2								
L442	0	5.709	7.477	0.200	0.082	2.055	570 PH, COLD, ORION DIGITAL IONANALYZER								
L162	0	5.780	7.348	0.155	0.016	0.71	57A PH, COLD, CORNING MODEL 12 RESEARCH METER								
L182C	0	5.850	7.380	0.202	0.077	0.07	57D PH, COLD, RADIOMETER TYPE PH M 28								
L251C	0	5.892	7.034	0.459	0.001	0.44	57P PH, COLD, RADIOMETER TYPE PH M64								
GMEANS:		5.729	7.200			1.000									
		95% ELLIPSE:	1.0492	0.208			WIDE GAMMA = 77 DEGREES								

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-2 TABLE 1
HYDROGEN ION CONCENTRATION (PH), HOT
TAPPI OFFICIAL TEST METHOD T435 CS-77

SEPTEMBER 1979

LAB CODE	SAMPLE A59	REPRODUCTION 78 GRAMS PER SQUARE METER				SAMPLE J78	PRINTING 89 GRAMS PER SQUARE METER				TEST D ₀ = 5		
	MEAN	DEV	N ₀ DEV	SDR	A ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L128	4.960	0.222	0.00	0.000	1.01	7.580	0.125	0.77	0.045	0.70	57L	0	L128
L162	4.926	0.250	0.000	0.022	0.40	NO DATA REPORTED FOR SAMPLE J78					57C	M	L162
L174H	5.542	0.359	0.00	0.028	0.51	7.896	0.191	1.17	0.021	0.33	57G	0	L174H
L182H	5.188	0.000	0.02	0.040	0.84	7.784	0.079	0.49	0.100	1.57	57E	0	L182H
L334	5.142	0.040	0.10	0.188	3.45	8.618	1.113	6.84	0.144	2.25	57C	#	L334
L484B	5.040	0.142	0.00	0.089	1.65	7.560	0.145	0.89	0.089	1.40	57Z	0	L484B
GR. MEAN = 5.182 PH UNITS													

The following laboratories were omitted from the
grand means because of extreme test results: 334.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T57-2 TABLE 2
HYDROGEN ION CONCENTRATION (PH), HOT
TAPPI OFFICIAL TEST METHOD T435 CS-77

SEPTEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG A ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		A59	J78	ADJUD	MINOR			
L162	M	4.926				0.40	57C	PH, HOT, CORNING MODEL 12 RESEARCH METER
L128	0	4.960	7.580	0.200	0.010	0.05	57L	PH, HOT, L+N
L484B	0	5.040	7.560	0.197	0.049	1.00	57Z	PH, HOT, BECKMAN MODEL H2
L334	#	5.142	8.618	0.547	0.970	2.00	57C	PH, HOT, CORNING MODEL 12 RESEARCH METER
L182H	0	5.188	7.784	0.040	0.004	1.00	57E	PH, HOT, RADIOMETER TYPE PH M 28
L174H	0	5.542	7.896	0.400	0.025	0.42	57G	PH, HOT, FISHER ACCUMET MODEL 220
GMEANS:		5.182	7.705			1.00		
		95% ELLIPSE:	2.204	0.375		WITH GRAMMA = 31 DEGREES		

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

TAPPI OFFICIAL TEST METHOD T425 G3-75, OPACITY OF PAPER (15 DEG/DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE G01 MEAN	HIGH BRIGHTNESS PRINTING 116 GRAMS PER SQUARE METER				SAMPLE E05 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	NO DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L105	56.20	0.32	0.94	0.14	0.02	89.84	0.12	0.28	0.48	1.36	60H	0	L105
L108	55.55	-0.33	-0.90	0.31	1.37	89.89	0.17	0.40	0.82	2.30	60B	0	L108
L115	56.29	0.41	1.20	0.11	0.48	90.16	0.44	1.03	0.29	0.81	60B	0	L115
L118	55.82	-0.00	-0.10	0.14	0.61	89.75	0.03	0.07	0.16	0.47	60B	0	L118
L122	56.24	0.30	1.00	0.13	0.59	89.94	0.22	0.52	0.46	1.30	60D	0	L122
L123	56.00	0.12	0.50	0.23	1.01	89.21	-0.51	-1.20	0.63	1.78	60W	0	L123
L124	56.26	0.38	1.11	0.08	2.96	89.72	0.00	0.00	0.61	1.73	60B	0	L124
L125	55.79	-0.09	-0.27	0.30	1.57	89.59	-0.13	-0.30	0.35	0.99	60H	0	L125
L132	55.48	-0.40	-1.10	0.20	0.99	89.12	-0.60	-1.41	0.26	0.74	60B	0	L132
L136	55.69	-0.19	-0.50	0.11	0.48	89.39	-0.33	-0.77	0.20	0.57	60H	0	L136
L139	55.70	-0.10	-0.30	0.29	1.26	89.61	-0.11	-0.26	0.27	0.77	60B	0	L139
L148H	55.82	-0.00	-0.10	0.20	1.03	89.35	-0.37	-0.87	0.36	1.01	60H	0	L148H
L152	56.05	0.17	0.49	0.08	0.37	90.40	0.68	1.60	0.24	0.69	60B	0	L152
L157	56.45	0.57	1.07	0.37	1.02	90.25	0.53	1.24	0.26	0.74	60B	0	L157
L158	55.72	-0.10	-0.40	0.10	0.71	89.55	-0.17	-0.40	0.44	1.25	60D	0	L158
L162	56.08	0.20	0.58	0.17	0.74	90.04	0.32	0.75	0.27	0.77	60W	0	L162
L166	55.23	-0.60	-1.92	0.15	0.65	88.99	-0.73	-1.71	0.37	1.05	60B	0	L166
L172	55.95	0.07	0.20	0.08	0.37	89.46	-0.26	-0.61	0.39	1.10	60B	0	L172
L190C	55.40	-0.43	-1.42	0.10	0.60	89.14	-0.58	-1.36	0.39	1.10	60B	0	L190C
L190R	55.02	-0.20	-0.77	0.17	0.74	89.10	-0.62	-1.45	0.27	0.78	60B	0	L190R
L206	55.82	-0.00	-0.10	0.19	0.62	89.83	0.11	0.26	0.29	0.83	60B	0	L206
L210B	56.20	0.32	0.94	0.19	0.60	90.33	0.61	1.43	0.25	0.70	60B	0	L210B
L210D	55.96	0.03	0.20	0.18	0.03	89.96	0.24	0.56	0.25	0.69	60D	0	L210D
L211S	55.95	0.07	0.20	0.10	0.69	89.85	0.13	0.31	0.24	0.68	60R	0	L211S
L212	56.51	0.63	1.00	0.62	2.73	90.34	0.62	1.46	0.81	2.28	60B	0	L212
L213	56.19	0.31	0.94	0.20	1.12	90.30	0.58	1.36	0.80	2.26	60B	0	L213
L223B	56.09	0.21	0.61	0.10	0.07	90.23	0.51	1.20	0.28	0.79	60B	0	L223B
L225	50.43	0.55	1.01	0.49	2.17	89.92	0.20	0.47	0.48	1.36	60B	0	L225
L226B	57.30	1.42	4.17	0.23	0.99	89.62	-0.10	-0.23	0.34	0.96	60B	X	L226B
L228	55.49	-0.39	-1.10	0.19	0.61	88.73	-0.99	-2.32	0.35	0.99	60H	0	L228
L230	55.49	-0.39	-1.10	0.32	1.39	89.17	-0.55	-1.29	0.30	0.85	60B	0	L230
L241	56.18	0.30	0.90	0.24	1.07	89.98	0.26	0.61	0.41	1.16	60B	0	L241
L254	55.75	-0.13	-0.39	0.20	1.08	89.44	-0.28	-0.66	0.39	1.09	60H	0	L254
L259	55.93	0.05	0.14	0.14	0.02	89.92	0.20	0.47	0.27	0.76	60B	0	L259
L262	56.09	0.21	0.61	0.17	0.70	90.20	0.48	1.13	0.23	0.65	60R	0	L262
L275	56.16	0.28	0.92	0.22	0.95	89.67	-0.05	-0.12	0.34	0.95	60R	0	L275
L278	55.76	-0.12	-0.30	0.24	1.00	89.75	0.03	0.07	0.31	0.88	60B	0	L278
L285D	55.17	-0.71	-2.09	0.21	0.90	88.94	-0.78	-1.83	0.36	1.01	60D	0	L285D
L285R	55.18	-0.70	-2.00	0.19	0.85	84.91	-4.81	-11.29	5.29	14.92	60R	#	L285R
L288	56.35	0.47	1.00	0.21	0.93	90.02	0.30	0.70	0.29	0.82	60D	0	L288
L301	55.84	-0.04	-0.12	0.14	0.03	89.74	0.02	0.05	0.42	1.19	60B	0	L301
L305	55.92	0.04	0.11	0.20	1.11	90.06	0.34	0.80	0.12	0.33	60R	0	L305
L308	56.06	0.18	0.52	0.10	0.59	90.39	0.67	1.57	0.33	0.94	60H	0	L308
L317	55.61	-0.27	-0.80	0.24	1.00	89.68	-0.04	-0.09	0.21	0.61	60B	0	L317
L323	56.43	0.50	1.01	0.20	1.24	90.55	0.83	1.95	0.41	1.16	60W	0	L323
L339	55.60	-0.20	-0.83	0.00	2.08	89.85	0.13	0.31	0.41	1.16	60B	0	L339
L341	55.33	-0.55	-1.00	0.20	0.99	89.30	-0.36	-0.84	0.12	0.33	60R	0	L341
L348	55.28	-0.60	-1.77	0.21	0.92	89.16	-0.54	-1.27	0.23	0.65	60D	0	L348
L349	55.85	-0.03	-0.09	0.10	0.00	89.76	0.04	0.09	0.18	0.52	60D	0	L349
L354	54.99	-0.89	-2.00	0.30	1.31	90.40	0.68	1.60	1.93	5.43	60B	X	L354
L366	54.80	-1.00	-3.10	0.42	1.85	88.60	-0.92	-2.16	0.42	1.19	60L	#	L366
L390	56.13	0.20	0.70	0.20	1.20	90.30	0.58	1.36	0.30	0.94	60B	0	L390
L523	55.84	-0.04	-0.12	0.10	0.59	89.23	-0.49	-1.15	0.24	0.68	60R	0	L523
L567	55.95	0.07	0.20	0.10	0.61	89.83	0.11	0.26	0.37	1.03	60D	0	L567
L571	56.15	0.27	0.79	0.24	1.04	89.83	0.11	0.26	0.47	1.32	60D	0	L571
L573	56.02	0.14	0.41	0.23	1.03	90.05	0.33	0.78	0.26	0.74	60H	0	L573
L581	55.91	0.03	0.00	0.21	0.91	89.67	0.15	0.35	0.44	1.25	60B	0	L581
L587	55.67	-0.01	-0.00	0.10	0.59	90.02	0.30	0.70	0.35	0.98	60B	0	L587
L592	55.85	-0.00	-0.09	0.24	1.04	89.46	-0.26	-0.61	0.36	1.01	60W	0	L592
L594	55.98	0.10	0.29	0.10	0.77	90.04	0.32	0.75	0.55	1.54	60D	0	L594
L597	55.05	-0.83	-2.00	0.10	0.09	88.15	-1.57	-3.68	0.47	1.34	60B	#	L597
L608	55.44	-0.44	-1.00	0.20	0.88	89.96	0.24	0.56	0.29	0.81	60D	#	L608
L636	56.27	0.39	1.14	0.21	0.92	89.42	-0.30	-0.70	0.28	0.80	60R	#	L636
L673R	56.05	0.17	0.49	0.00	0.37	89.65	-0.07	-0.16	0.18	0.50	60B	0	L673R
L673T	55.89	0.01	0.02	0.17	0.73	89.52	-0.20	-0.47	0.28	0.78	60B	0	L673T

ANALYSIS T60-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

TAPPI OFFICIAL TEST METHOD T425 05-75, OPACITY OF PAPER (15 DEG/DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE G01 MEAN	HIGH BRIGHTNESS PRINTING 116 GRAMS PER SQUARE METER				SAMPLE E85 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D ₀ = 10			
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAP	F	LAB	
L692	55.84	-0.04	-0.12	0.37	1.03	59.42	-0.30	-0.70	0.38	1.08	60D	6	L692	
L698	55.78	-0.10	-0.30	0.25	1.01	59.29	-0.43	-1.01	0.46	1.33	60D	6	L698	
L712	57.05	1.17	3.44	0.28	1.24	90.26	0.48	1.13	0.59	1.65	60E	X	L712	
GR. MEAN = 55.88 PERCENT GRAND MEAN = 59.72 PERCENT TEST DETERMINATIONS = 10														
SD MEANS = 0.34 PERCENT SD OF MEANS = 0.43 PERCENT 63 LABS IN GRAND MEANS														
AVERAGE SDR = 0.23 PERCENT AVERAGE SDR = 0.35 PERCENT														
L219	57.00	1.12	3.29	0.00	0.00	62.00	-7.72	-18.12	0.00	0.00	60E	*	L219	
L224	55.81	-0.07	-0.21	0.33	1.44	59.39	-0.33	-0.77	0.25	0.70	60P	*	L224	
L249	55.60	-0.20	-0.03	0.20	1.15	59.83	-0.89	-2.09	0.53	1.50	60P	*	L249	
L256	55.52	-0.30	-1.00	0.21	0.94	59.57	-1.15	-2.70	0.21	0.58	60N	*	L256	
L277	55.20	-0.68	-2.01	0.42	1.83	59.60	-1.12	-2.63	0.52	1.46	60P	*	L277	
L312	55.00	-0.68	-2.09	0.00	0.00	59.10	-1.62	-3.80	0.21	0.59	60P	*	L312	
L380	55.30	-0.58	-1.71	0.35	1.03	59.40	-1.32	-3.10	0.52	1.46	60P	*	L380	
L564	55.60	-0.20	-0.03	0.32	2.20	59.00	-0.72	-1.69	0.00	0.00	60P	*	L564	
L685B	55.96	0.03	0.23	0.08	0.37	59.59	-0.13	-0.30	0.31	0.87	60P	*	L685B	
L687	56.65	0.77	2.20	0.41	1.80	59.70	-0.02	-0.05	0.42	1.19	60P	*	L687	
L704	55.00	-0.83	-2.09	0.24	1.03	NO DATA REPORTED FOR SAMPLE E85					60P	*	L704	
TOTAL NUMBER OF LABORATORIES REPORTING = 79														
Best values: G01 95.9 ± 0.6 percent														
E85 89.7 ± 0.7 percent														

The following laboratories were omitted from the grand means because of extreme test results: 597.

OPACITY (% BY REFLECTANCE BACKING) IN PERCENT - PRIMARILY PINE PAPERS
TAPPI OFFICIAL TEST METHOD T425 63-70, OPACITY OF PAPER (15 DEG/DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG R _{0.002} V _{0.002}	PROPERTY---TEST INSTRUMENT---CONDITIONS				
		G01	B85	MAJOR	MINOR						
L366	*	94.80	88.80	-1.038	0.32	1.032	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L354	X	94.59	90.40	0.02	1.012	0.037	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L704	*	95.00				1.003	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L312	*	95.00	88.10	-1.083	-0.25	0.00	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L597	#	95.05	88.15	-1.070	-0.20	1.031	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L285D	0	95.17	88.94	-1.000	0.11	0.95	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L285P	#	95.18	84.91	-0.29	-2.029	7.008	0.00	OPACITY (WHITE BACKING)	82	T0	95%, THWING-ALBERT (WAS SRL)
L277	*	95.20	88.60	-1.031	-0.12	1.005	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L166	0	95.23	88.95	-0.97	0.09	0.95	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L348	0	95.23	89.18	-0.79	0.10	0.78	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L380	*	95.30	88.40	-1.041	-0.32	1.049	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L341	0	95.33	89.36	-0.62	0.23	0.60	0.00	OPACITY (WHITE BACKING)	82	T0	95%, THWING-ALBERT (WAS SRL)
L190C	0	95.40	89.14	-0.75	0.04	0.95	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L608	*	95.44	89.96	-0.07	0.00	0.90	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L132	0	95.48	89.12	-0.72	-0.03	0.60	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L230	0	95.49	89.17	-0.07	-0.01	1.012	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L228	0	95.49	88.73	-1.003	-0.27	0.90	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN
L256	*	95.52	88.57	-1.014	-0.39	0.70	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUNTER
L108	0	95.55	89.89	-0.00	0.37	1.004	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L564	*	95.60	89.00	-0.70	-0.20	1.015	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L249	*	95.60	88.83	-0.00	-0.30	1.032	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L339	0	95.60	89.85	-0.00	0.30	0.92	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L317	0	95.61	89.68	-0.15	0.20	0.93	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L190R	0	95.62	89.10	-0.05	0.16	0.76	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L136	0	95.69	89.39	-0.00	-0.04	0.93	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN
L139	0	95.70	89.61	-0.20	0.08	1.031	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L158	0	95.72	89.55	-0.23	0.03	0.98	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L254	0	95.75	89.44	-0.30	-0.06	1.008	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN
L278	0	95.76	89.75	-0.00	0.12	0.97	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L698	0	95.78	89.29	-0.41	-0.17	1.015	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L125	0	95.79	89.59	-0.10	-0.00	1.026	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN
L224	*	95.81	89.39	-0.31	-0.14	1.007	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L118	0	95.82	89.75	-0.01	0.07	0.94	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L206	0	95.82	89.83	0.00	0.12	0.93	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L148H	0	95.82	89.35	-0.03	-0.17	1.002	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN
L692	0	95.84	89.42	-0.27	-0.14	1.030	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L523	0	95.84	89.23	-0.42	-0.20	0.93	0.00	OPACITY (WHITE BACKING)	82	T0	95%, THWING-ALBERT (WAS SRL)
L301	0	95.84	89.74	-0.01	0.05	0.91	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L592	0	95.85	89.40	-0.20	-0.13	1.002	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN, DIGITAL
L349	0	95.85	89.76	0.01	0.05	0.99	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L587	0	95.87	90.02	0.23	0.19	0.70	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L673T	0	95.89	89.52	-0.10	-0.13	0.70	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L581	0	95.91	89.87	0.14	0.07	1.008	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L305	0	95.92	90.06	0.30	0.17	0.72	0.00	OPACITY (WHITE BACKING)	82	T0	95%, THWING-ALBERT (WAS SRL)
L259	0	95.93	89.92	0.19	0.08	0.99	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L211S	0	95.95	89.85	0.10	0.02	0.99	0.00	OPACITY (WHITE BACKING)	82	T0	95%, THWING-ALBERT (WAS SRL)
L567	0	95.95	89.83	0.13	0.01	0.92	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L172	0	95.95	89.46	-0.17	-0.21	0.73	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L685B	*	95.96	89.59	-0.00	-0.14	0.92	0.00	OPACITY (WHITE BACKING)	82	T0	95%, PHOTOVOLT
L210D	0	95.90	89.96	0.24	0.08	0.90	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L594	0	95.98	90.04	0.32	0.11	1.010	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L123	0	96.00	89.21	-0.34	-0.40	1.040	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN, DIGITAL
L573	0	96.02	90.05	0.30	0.06	0.99	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN
L152	0	96.05	90.40	0.00	0.27	0.93	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L673R	0	96.05	89.65	0.04	-0.18	0.94	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L308	0	96.06	90.39	0.00	0.25	0.77	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN
L162	0	96.08	90.04	0.00	0.03	0.70	0.00	OPACITY (WHITE BACKING)	82	T0	95%, HUYGEN, DIGITAL
L223B	0	96.09	90.23	0.03	0.14	0.73	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L262	0	96.09	90.20	0.01	0.12	0.70	0.00	OPACITY (WHITE BACKING)	82	T0	95%, THWING-ALBERT (WAS SRL)
L390	0	96.13	90.30	0.01	0.14	1.002	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L571	0	96.15	89.83	0.20	-0.15	1.010	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BNL-2
L275	0	96.16	89.67	0.13	-0.25	0.90	0.00	OPACITY (WHITE BACKING)	82	T0	95%, THWING-ALBERT (WAS SRL)
L241	0	96.18	89.98	0.09	-0.09	1.012	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L213	0	96.19	90.30	0.00	0.10	1.007	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB
L210B	0	96.20	90.33	0.00	0.11	0.70	0.00	OPACITY (WHITE BACKING)	82	T0	95%, BAUSCH * LOMB

ANALYSIS T60-1 TABLE 2

OPACITY (5% REFLECTANCE BACKING) IN PERCENT - PRIMARILY FINE PAPERS

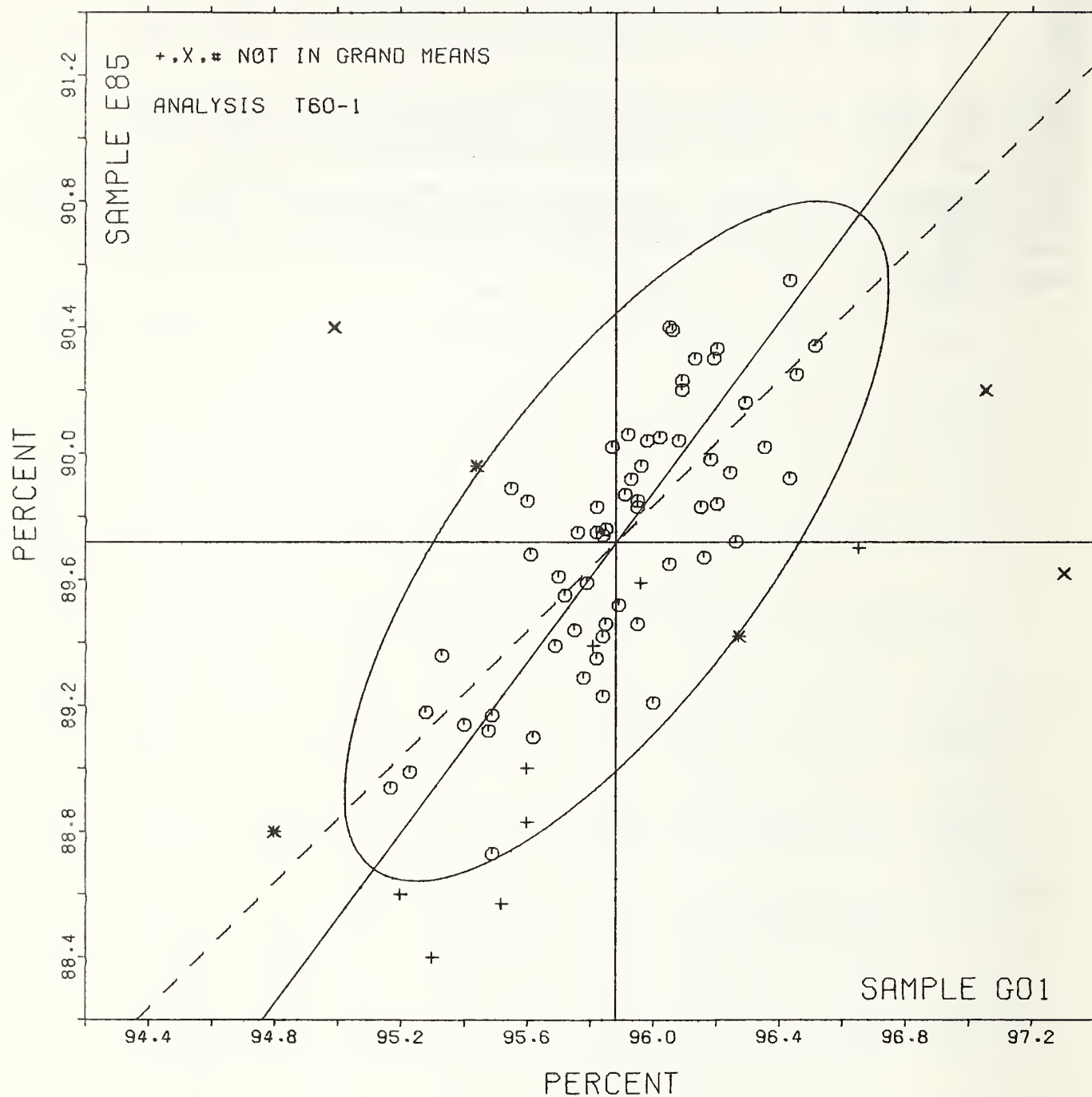
TAPPI OFFICIAL TEST METHOD T425 03-73, OPACITY OF PAPER (15 DEGS/DIFFUSE, ILLUMINANT A) - E&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG NO. OF VALS	PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		G01	E85	MAJOR	MINOR				
L105	0	56.20	89.84	0.29	-0.18	0.99	001	OPACITY (WHITE BACKING)	82 TO 95%, HUYGEN
L122	0	56.24	89.94	0.39	-0.16	0.95	000	OPACITY (WHITE BACKING)	82 TO 95%, BNL-2
L124	0	56.26	89.72	0.22	-0.30	2.04	000	OPACITY (WHITE BACKING)	82 TO 95%, BAUSCH + LOMB
L636	*	56.27	89.42	-0.01	-0.49	0.00	000	OPACITY (WHITE BACKING)	82 TO 95%, THWING-ALBERT (WAS SRL)
L115	0	56.29	90.16	0.00	-0.07	0.05	000	OPACITY (WHITE BACKING)	82 TO 95%, BAUSCH + LOMB
L288	#	56.35	90.02	0.52	-0.20	0.67	000	OPACITY (WHITE BACKING)	82 TO 95%, BNL-2
L323	0	56.43	90.55	0.99	0.05	1.20	000	OPACITY (WHITE BACKING)	82 TO 95%, HUYGEN, DIGITAL
L225	0	56.43	89.92	0.49	-0.32	1.70	000	OPACITY (WHITE BACKING)	82 TO 95%, BAUSCH + LOMB
L157	0	56.45	90.25	0.70	-0.14	1.18	000	OPACITY (WHITE BACKING)	82 TO 95%, BAUSCH + LOMB
L212	0	56.51	90.34	0.67	-0.14	2.01	000	OPACITY (WHITE BACKING)	82 TO 95%, BAUSCH + LOMB
L687	*	56.65	89.70	0.44	-0.63	1.00	000	OPACITY (WHITE BACKING)	82 TO 95%, PHOTOVOLT
L219	*	57.00	82.00	-0.35	-0.48	0.00	000	OPACITY (WHITE BACKING)	82 TO 95%, Z. ELREPHO, FMY-C(10) FILTER
L712	X	57.05	90.20	1.00	-0.65	1.45	000	OPACITY (WHITE BACKING)	82 TO 95%, BAUSCH + LOMB
L226B	X	57.30	89.62	0.70	-1.20	0.97	000	OPACITY (WHITE BACKING)	82 TO 95%, BAUSCH + LOMB
GMEANS:		55.88	89.72			1.00			
		55% ELLIPSE:		1.29	0.48				With GAMMA = 53 DEGREES

OPACITY, B&L, 89% BACKING, FINE P.

SAMPLE G01 = 95.9 PERCENT

SAMPLE E85 = 89.7 PERCENT



OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T519 GS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE G01 MEAN	HIGH BRIGHTNESS PRINTING 116 GRAMS PER SQUARE METER				SAMPLE L65 MEAN	BOND 79 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	K ₀ SDR		DEV	N ₀ DEV	SDR	K ₀ SDR	VAR	F	LAB
L182E	94.33	-0.09	-0.30	0.13	0.66	92.20	0.15	0.59	0.27	1.12	60J	0	L182E
L219	94.40	-0.02	-0.09	0.52	2.03	92.30	0.25	0.99	0.48	2.02	60F	0	L219
L242	94.48	0.00	0.23	0.14	0.68	91.90	-0.15	-0.61	0.20	0.84	60J	0	L242
L244	94.21	-0.21	-0.69	0.20	1.02	91.76	-0.29	-1.01	0.13	0.57	60F	0	L244
L250T	94.21	-0.21	-0.39	0.21	1.04	91.96	-0.09	-0.37	0.31	1.30	60J	0	L250T
L251	96.86	2.44	10.34	0.14	0.70	94.56	2.50	10.04	0.18	0.77	60F	#	L251
L309	94.07	-0.35	-1.03	0.18	0.90	91.53	-0.52	-2.10	0.25	1.03	60J	0	L309
L313	94.67	0.25	1.00	0.22	1.00	92.37	0.32	1.27	0.14	0.59	60J	0	L313
L360	94.06	-0.36	-1.03	0.15	0.74	91.63	-0.22	-0.89	0.19	0.79	60F	0	L360
L446	94.49	0.07	0.31	0.14	0.69	92.10	0.05	0.19	0.25	1.06	60J	0	L446
L484	94.60	0.18	0.70	0.10	0.80	92.31	0.26	1.03	0.22	0.94	60F	0	L484
L575	94.45	0.07	0.30	0.17	0.81	91.99	-0.06	-0.25	0.22	0.94	60J	0	L575
L598	94.45	0.03	0.13	0.18	0.87	91.97	-0.08	-0.33	0.17	0.71	60J	0	L598
L678	94.93	0.51	2.10	0.21	1.01	92.36	0.31	1.23	0.34	1.41	60J	0	L678
L685A	94.49	0.07	0.30	0.19	0.94	92.16	0.11	0.43	0.16	0.69	60F	0	L685A

GR₀ MEAN = 94.42 PERCENT
SD MEANS = 0.24 PERCENTGRAND MEAN = 92.05 PERCENT
SD OF MEANS = 0.25 PERCENTTEST DETERMINATIONS = 10
14 LABS IN GRAND MEANS

AVERAGE SDR = 0.20 PERCENT

AVERAGE SDR = 0.24 PERCENT

L118	93.63	-0.79	-3.33	0.23	1.13	91.49	-0.56	-2.26	0.42	1.77	60C	*	L118
L190C	93.92	-0.50	-2.12	0.30	2.74	91.74	-0.31	-1.25	0.48	2.03	60C	*	L190C
L190R	93.74	-0.68	-2.00	0.22	1.09	91.65	-0.40	-1.62	0.39	1.64	60C	*	L190R
L626	94.00	-0.42	-1.70	0.00	0.00	91.10	-0.95	-3.82	0.21	0.88	60Q	*	L626

TOTAL NUMBER OF LABORATORIES PARTICIPATING = 19

Best values: G01 94.4 ± 0.4 percent
E85 92.0 ± 0.4 percent

The following laboratories were omitted from the grand means because of extreme test results: 251.

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY FINE PAPERS
TAPPI OFFICIAL TEST METHOD T519 GS-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

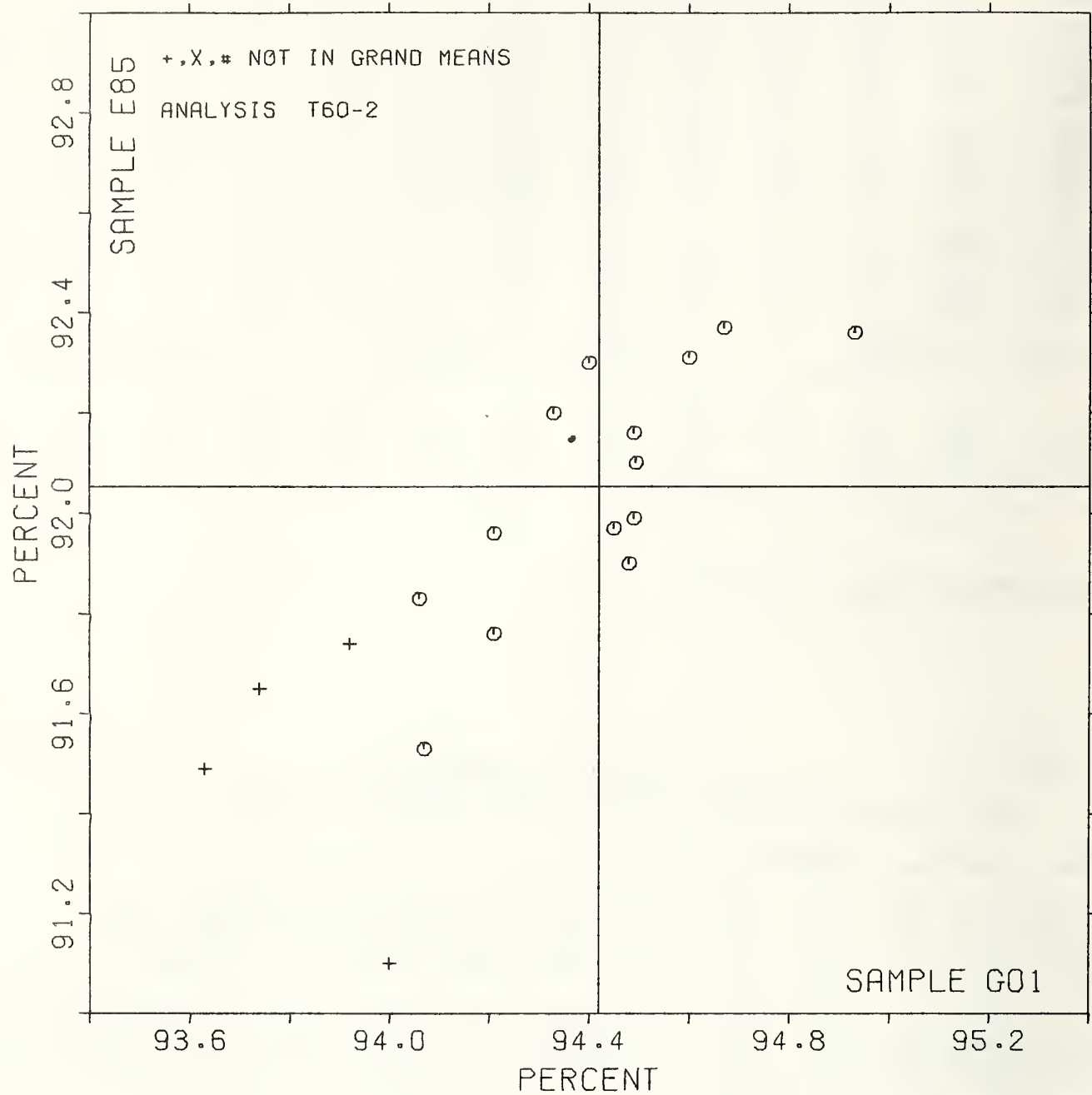
LAB CODE	F	MEANS		COORDINATES		AVG K ₀ SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS						
		G01	E85	MAJOR	MINOR								
L118	*	93.63	91.49	-0.90	0.19	1.43	00C	OPACITY (PAPER BACKING)	82	T0	95%	BAUSCH * LOMB	
L190R	*	93.74	91.65	-0.70	0.22	1.37	00C	OPACITY (PAPER BACKING)	82	T0	95%	BAUSCH * LOMB	
L190C	*	93.92	91.74	-0.57	0.15	2.38	00C	OPACITY (PAPER BACKING)	82	T0	95%	BAUSCH * LOMB	
L626	*	94.00	91.10	-0.98	-0.34	0.44	00Q	OPACITY (PAPER BACKING)	82	T0	95%	PHOTOVOLT	
L360	0	94.06	91.83	-0.41	0.11	0.70	00F	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10)NO TRAP	
L309	0	94.07	91.53	-0.02	-0.10	0.96	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L244	0	94.21	91.76	-0.30	-0.05	0.92	00F	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10)NO TRAP	
L250T	0	94.21	91.96	-0.21	0.09	1.07	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L182E	0	94.33	92.20	0.05	0.17	0.09	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L219	0	94.40	92.30	0.17	0.18	2.28	00F	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10)NO TRAP	
L598	0	94.45	91.97	-0.34	-0.08	0.79	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L242	0	94.48	91.90	-0.07	-0.15	0.70	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L575	0	94.49	91.99	0.00	-0.05	0.00	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L685A	0	94.49	92.16	0.13	0.32	0.01	00F	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10)NO TFAP	
L446	0	94.49	92.10	0.09	-0.02	0.88	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L484	0	94.60	92.31	0.31	0.04	0.07	00F	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10)NO TRAP	
L313	0	94.67	92.37	0.40	0.03	0.03	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L678	0	94.93	92.36	0.37	-0.16	1.21	00J	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10) FILTER	
L251	#	96.86	94.56	3.00	-0.08	0.74	00F	OPACITY (PAPER BACKING)	82	T0	95%	Z0.ELREPH0,FMY-C(10)NO TRAP	

GMEANS: 94.42 92.05 1.00
95% ELLIPSE: 0.94 0.32 44.44 GAMMA = 47 DEGREES

OPACITY, ELREPHO, PAPER BACKING, FINE P

SAMPLE G01 = 94.42 PERCENT

SAMPLE E85 = 92.05 PERCENT



ANALYSIS T61-1 TABLE 1

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T425 60-70, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE Z03 MEAN	NEWSPRINT 58 GRAMS PER SQUARE METER				SAMPLE G13 MEAN	15 LB. BOND 56 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L121	53.76	.23	.44	.35	.75	81.17	-.67	-1.07	.92	1.26	61B	0	L121
L122	53.90	.37	.71	.28	.63	81.66	-.78	-1.25	.94	1.29	61D	0	L122
L150	53.45	-.08	-.10	.70	1.72	79.60	-2.04	-3.26	.71	.98	61B	#	L150
L159	54.11	.58	1.12	.30	.61	81.03	-.81	-1.29	.59	.81	61R	0	L159
L210B	53.99	.40	.89	.42	.94	82.01	.17	.27	.85	1.17	61B	0	L210B
L210D	53.64	.11	.21	.33	.75	81.68	-.16	-.26	.93	1.28	61D	0	L210D
L261	54.09	.50	1.00	.44	1.00	82.95	1.11	1.77	.96	1.32	61B	0	L261
L281	53.68	.15	.29	.63	1.43	82.39	.55	.87	.57	.79	61D	0	L281
L315	53.59	.00	.11	.00	1.30	81.73	-.11	-.18	.28	.38	61D	0	L315
L317	53.76	.23	.44	.43	.97	81.84	-.00	-.00	.91	1.25	61B	0	L317
L318	52.90	-.63	-1.22	.61	1.39	81.85	.01	.01	.78	1.08	61B	0	L318
L333	53.10	-.43	-.80	.40	1.04	81.26	-.58	-.93	1.00	1.37	61B	0	L333
L352	52.25	-1.28	-2.48	.27	.61	81.50	-.34	-.54	.50	.69	61R	0	L352
L599	53.20	-.33	-.64	.63	1.43	82.75	.91	1.45	.35	.49	61B	0	L599
L713	53.47	-.06	-.12	.39	.69	82.56	.72	1.15	.61	.84	61R	0	L713

GR₀ MEAN = 93.53 PERCENT

GRAND MEAN = 81.84 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = .52 PERCENT

SD OF MEANS = .63 PERCENT

14 LABS IN GRAND MEANS

AVERAGE SDR = .44 PERCENT

AVERAGE SDR = .73 PERCENT

L260 53.55 .02 .04 .44 .99 82.40 -1.44 -2.30 .39 .54 61P * L260

TOTAL NUMBER OF LABORATORIES PARTICIPATING = 10

Best values: Z03 93.6 ± 1.1 percent

G13 81.7 ± 1.1 percent

The following laboratories were omitted from the grand means because of extreme test results: 150.

ANALYSIS T61-1 TABLE 2

OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T425 60-70, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

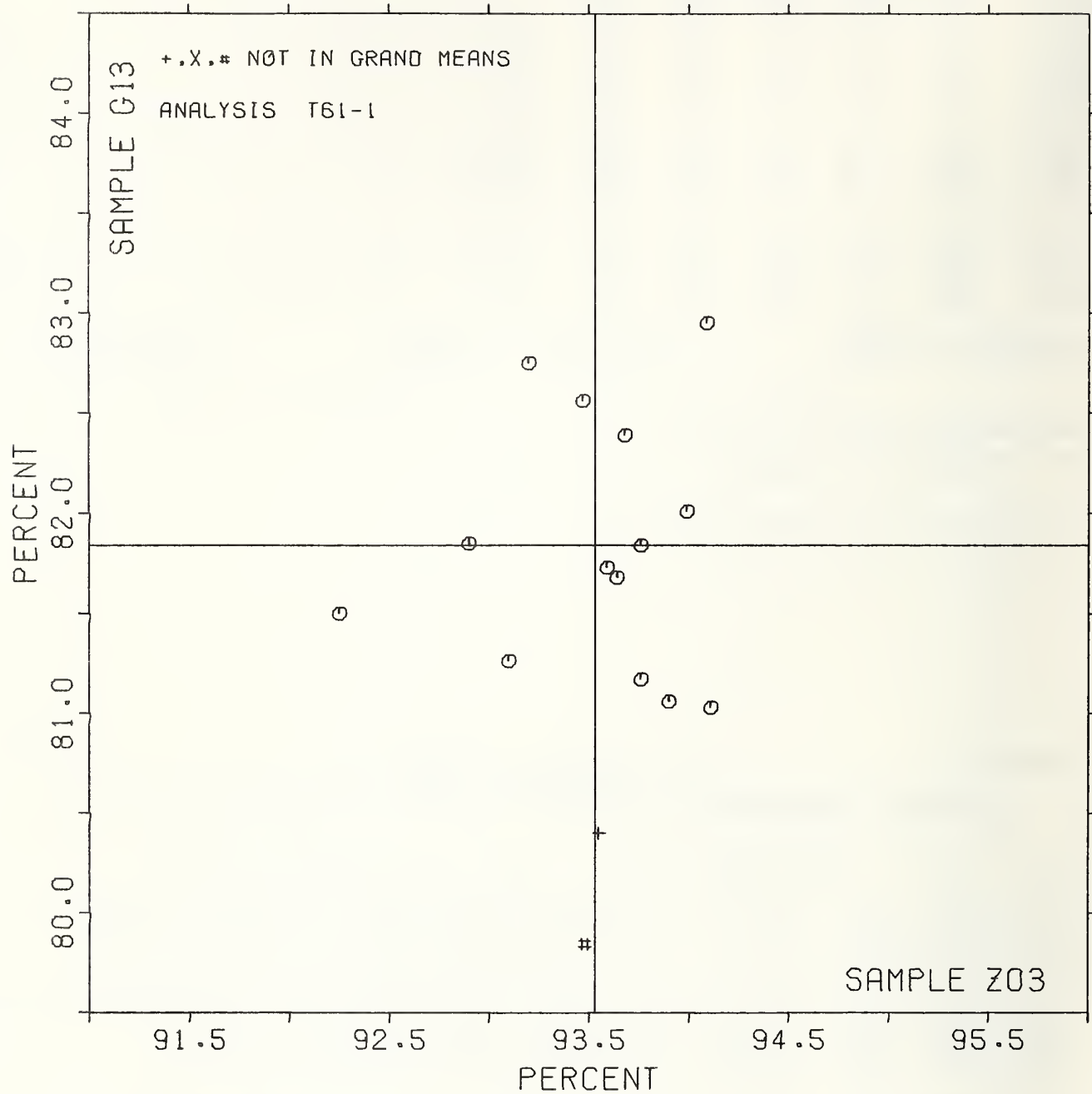
LAB CODE	F	MEANS		COORDINATES		AVG R ₀ SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS						
		Z03	G13	MAJOR	MINOR								
L352	0	92.25	81.50	-.48	1.24	.65	61R	OPACITY (WHITE BACKING)70	T0	90%, THWING-ALBERT (WAS SPL)			
L318	0	52.90	81.85	-.60	.63	1.23	61B	OPACITY (WHITE BACKING)70	T0	90%, BAUSCH * LOMB			
L333	0	53.10	81.26	-.62	.37	1.21	61B	OPACITY (WHITE BACKING)70	T0	50%, BAUSCH * LOMB			
L599	0	53.20	82.75	.87	.43	.96	61B	OPACITY (WHITE BACKING)70	T0	90%, BAUSCH * LOMB			
L150	#	53.45	79.80	-2.04	-.14	1.00	61B	OPACITY (WHITE BACKING)70	T0	50%, BAUSCH * LOMB			
L713	0	53.47	82.56	.71	.14	.80	61R	OPACITY (WHITE BACKING)70	T0	90%, THWING-ALBERT (WAS SRL)			
L260	*	53.55	80.40	-1.43	-.17	.77	61P	OPACITY (WHITE BACKING)70	T0	90%, PHOTOVOLT			
L315	0	53.59	81.73	-.19	-.07	.67	61D	OPACITY (WHITE BACKING)70	T0	90%, BNL-2			
L210D	0	53.64	81.68	-.13	-.13	1.01	61D	OPACITY (WHITE BACKING)70	T0	50%, BNL-2			
L281	0	53.68	82.39	.30	-.09	1.11	61D	OPACITY (WHITE BACKING)70	T0	90%, BNL-2			
L317	0	53.76	81.84	.62	-.23	1.11	61B	OPACITY (WHITE BACKING)70	T0	90%, BAUSCH * LOMB			
L121	0	53.76	81.17	-.64	-.30	1.01	61B	OPACITY (WHITE BACKING)70	T0	90%, BAUSCH * LOMB			
L122	0	53.90	81.66	-.74	-.45	.90	61D	OPACITY (WHITE BACKING)70	T0	50%, BNL-2			
L210B	0	53.99	82.01	.22	-.44	1.06	61B	OPACITY (WHITE BACKING)70	T0	50%, BAUSCH * LOMB			
L261	0	54.09	82.95	1.10	-.44	1.10	61B	OPACITY (WHITE BACKING)70	T0	90%, BAUSCH * LOMB			
L159	0	54.11	81.03	-.74	-.66	.61	61R	OPACITY (WHITE BACKING)70	T0	90%, THWING-ALBERT (WAS SPL)			
GMEANS:		93.53	81.84			1.00							
		55% ELLIPSE:	1.82	1.50									

WAVELENGTH = 83 DEGREES

OPACITY, B&L, 89% BACKING, NEWS

SAMPLE Z03 = 93.5 PERCENT

SAMPLE G13 = 81.8 PERCENT



ANALYSIS T61-2 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	SAMPLE Z03		NEWSPRINT 58 GRAMS PER SQUARE METER			SAMPLE G13	15 LB. BOND 56 GRAMS PER SQUARE METER			TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	N ₀ SDR		DEV	N ₀ DEV	SDP	R ₀ SDR	VAP	F LAB
L150	96.91	-0.04	-0.70	.22	1.07	82.23	.21	.71	.63	1.26	61J	6 L150
L233F	96.99	.04	.70	.20	.93	81.81	-0.21	-0.71	.37	.74	61F	6 L233F

GR. MEAN = 96.95 PERCENT

GRAND MEAN = 82.02 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = .06 PERCENT

SD OF MEANS = .30 PERCENT

2 LABS IN GRAND MEANS

AVERAGE SDR = .21 PERCENT

AVERAGE SDP = .50 PERCENT

L153 93.80 -3.15 -00.69 .48 2.29 75.70 -2.32 -7.82 .55 1.17 61C 6 L153

TOTAL NUMBER OF LABORATORIES REPORTING = 3

ANALYSIS T61-2 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY NEWS, DIRECTORY, AND CATALOG
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	F	MEANS		COORDINATES		AVG N ₀ SDR VAR	PROPERTY--TEST INSTRUMENT--CONDITIONS
		Z03	G13	MAJOR	MINOR		
L153	6	93.80	79.70	1.70	-3.52	1.75	61C OPACITY (PAPER BACKING) 70 TO 90%, BAUSCH & LOMB
L150	6	96.91	82.23	-0.21	.00	1.16	61J OPACITY (PAPER BACKING) 70 TO 90%, Z ₀ ELREPHO, FMY-C(10) FILTER
L233F	6	96.99	81.81	.21	.00	.64	61F OPACITY (PAPER BACKING) 70 TO 90%, Z ₀ ELREPHO, FMY-C(10) NO TRAP
GMEANS:		96.95	82.02			1.00	
		95% ELLIPSE:		.00	.00		WITH GAMMA --79 DEGREES

ANALYSIS T62-2 TABLE 1

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY TRACING, VELLUM, LIGHTWEIGHT SHEETS
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	F	SAMPLE Z05		GASOLINE 47 GRAMS PER SQUARE METER			SAMPLE Z07	M.F. SULFITE 36 GRAMS PER SQUARE METER			TEST D ₀ = 10		
		MEAN	DEV	N ₀ DEV	SDR	N ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAP	F LAB
L313		74.70			.10		01.06			.30		62J	6 L313

GR. MEAN = 74.70 PERCENT

GRAND MEAN = 01.06 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = PERCENT

SD OF MEANS = PERCENT

1 LAB IN GRAND MEANS

AVERAGE SDR = .10 PERCENT

AVERAGE SDP = .30 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 1

ANALYSIS T62-2 TABLE 2

OPACITY (PAPER BACKING) IN PERCENT - PRIMARILY TRACING, VELLUM, LIGHTWEIGHT SHEETS
TAPPI OFFICIAL TEST METHOD T519 05-78, DIFFUSE OPACITY OF PAPER - ILLUMINANT C, ELREPHO TYPE

LAB CODE	F	MEANS		COORDINATES		AVG N ₀ SDR VAR	PROPERTY--TEST INSTRUMENT--CONDITIONS
		Z05	Z07	MAJOR	MINOR		
L313	6	74.70	61.36			1.00	62J OPACITY (PAPER BACKING) 45 TO 70%, Z ₀ ELREPHO, FMY-C(10) FILTER
GMEANS:		74.70	61.36			1.00	

ANALYSIS T62-1 TABLE 1
 OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY TRACING, VELLUM, AND LIGHTWEIGHT SHEETS
 TAPPI OFFICIAL TEST METHOD T425 05-70, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	SAMPLE Z05		GLASSINE 47 GRAMS PER SQUARE METER			SAMPLE Z07	M.F.S. SULFITE 36 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L122	69.30	.32	.34	.84	1.41	59.29	.12	.15	1.16	1.60	62D	0	L122
L131	68.04	-.94	-1.01	.74	1.24	57.97	-1.20	-1.47	.41	.56	62R	0	L131
L134	71.20	2.22	2.30	.92	1.55	62.60	3.43	4.20	.84	1.16	62R	#	L134
L326	69.26	.28	.29	.91	1.04	59.57	.80	.98	.86	1.18	62B	0	L326
L328	67.74	-1.24	-1.30	.22	.37	58.69	-.48	-.59	.34	.47	62B	0	L328
L396	69.29	.31	.33	.44	.75	58.94	-.23	-.28	.66	.90	62B	0	L396
L581	70.28	1.30	1.33	.70	1.18	60.15	.98	1.20	.94	1.29	62B	0	L581

GR. MEAN = 68.98 PERCENT

GRAND MEAN = 59.17 PERCENT

TEST DETERMINATIONS = 10

SD MEANS = .94 PERCENT

SD OF MEANS = .82 PERCENT

6 LABS IN GRAND MEANS

AVERAGE SDR = .59 PERCENT

AVERAGE SDR = .73 PERCENT

TOTAL NUMBER OF LABORATORIES REPORTING = 7

The following laboratories were omitted from the
 grand means because of extreme test results: 134.

ANALYSIS T62-1 TABLE 2
 OPACITY (89% REFLECTANCE BACKING) IN PERCENT - PRIMARILY TRACING, VELLUM, AND LIGHTWEIGHT SHEETS
 TAPPI OFFICIAL TEST METHOD T425 05-70, OPACITY OF PAPER (15 DEG./DIFFUSE, ILLUMINANT A) - B&L TYPE

LAB CODE	F	MEANS		COORDINATES		AVG R ₀ SDR VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS
		Z05	Z07	MAJOR	MINOR		
L328	0	67.74	58.69	-1.20	.44	.42 62B	OPACITY (WHITE BACKING) 45 TO 70%, BAUSCH + LOMB
L131	0	68.04	57.97	-1.00	-.39	.90 62K	OPACITY (WHITE BACKING) 45 TO 70%, THWING-ALBERT (WAS SPL)
L326	0	69.26	59.97	.73	.43	1.01 62B	OPACITY (WHITE BACKING) 45 TO 70%, BAUSCH + LOMB
L396	0	69.29	58.94	.00	-.37	.02 62B	OPACITY (WHITE BACKING) 45 TO 70%, BAUSCH + LOMB
L122	0	69.30	59.29	.32	-.11	1.01 62B	OPACITY (WHITE BACKING) 45 TO 70%, BNL-2
L581	0	70.28	60.15	1.02	-.09	1.04 62B	OPACITY (WHITE BACKING) 45 TO 70%, BAUSCH + LOMB
L134	#	71.20	62.60	.91	1.18	1.00 62K	OPACITY (WHITE BACKING) 45 TO 70%, THWING-ALBERT (WAS SRL)
GMEANS:		68.98	59.17			1.00	
		95% ELLIPSE:		4.90	1.48		WITH GAMMA = 40 DEGREES

DIRECTIONAL BLUE REFLECTANCE IN PERCENT
TAPPI STANDARD T452 OS-77, 'BRIGHTNESS', MARTIN SWEETS (ACBT & GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	SAMPLE J98		PRINTING 89 GRAMS PER SQUARE METER				SAMPLE B47		RELEASE BASE 82 GRAMS PER SQUARE METER				TEST D ₀ = 8		
	MEAN	DEV	N ₀ DEV	SD ₀	R ₀ SDR		MEAN	DEV	N ₀ DEV	SD ₀	R ₀ SDR		VAR	F	LAB
L108	76.07	.14	.022	.013	.92		67.14	.88	.88	.23	.69		65M	0	L108
L115	76.30	.30	.000	.011	.77		66.15	-.10	-.10	.21	.65		65N	0	L115
L122	76.11	.17	.029	.008	.80		65.54	-.72	-.72	.23	.69		65N	0	L122
L132	76.31	.37	.002	.010	.71		65.17	-1.08	-1.08	.37	1.13		65N	0	L132
L158	77.09	1.15	1.000	.008	.80		66.11	-.14	-.14	.20	.59		65N	0	L158
L172	73.71	-.23	-.000	.012	.90		65.61	-.64	-.64	.15	.44		65A	0	L172
L176A	74.39	-1.55	-2.000	.014	.98		65.70	-.55	-.55	.45	1.36		65A	0	L176A
L190C	75.51	-.43	-.071	.000	.80		65.00	-1.25	-1.25	.27	.83		65A	0	L190C
L210M	75.26	-.68	-1.012	.015	1.009		65.42	-.83	-.83	.36	1.08		65M	0	L210M
L210N	76.09	.15	.024	.011	.81		65.89	-.37	-.37	.46	1.39		65N	0	L210N
L211	76.44	.50	.002	.009	.66		66.60	.35	.35	.39	1.17		65N	0	L211
L225	77.19	1.25	2.000	.027	1.94		66.59	.33	.33	.22	.68		65N	0	L225
L275	75.42	-.51	-.000	.021	1.53		65.85	-.40	-.40	.42	1.28		65M	0	L275
L285	75.35	-.59	-.000	.018	1.28		65.10	-1.15	-1.15	.30	.90		65N	0	L285
L288	76.04	.10	.010	.018	1.27		66.15	-.10	-.10	.42	1.29		65N	0	L288
L308	76.25	.31	.001	.011	.77		65.04	-1.22	-1.22	.29	.89		65N	0	L308
L315	76.07	.14	.022	.020	1.84		66.99	.73	.73	.55	1.67		65N	0	L315
L317	75.91	-.03	-.000	.012	.90		65.65	-.60	-.60	.39	1.18		65M	0	L317
L523	75.20	-.74	-1.022	.011	.77		65.36	-.89	-.89	.27	.82		65N	0	L523
L543	76.41	.47	.070	.024	1.74		67.05	.80	.80	.25	.76		65M	0	L543
L565	73.62	-.31	-.002	.007	.31		66.30	.05	.05	.26	.79		65A	0	L565
L598	76.14	.20	.000	.014	1.02		67.09	.83	.83	.36	1.09		65N	0	L598
L636A	76.00	.00	.010	.019	1.39		66.01	1.76	1.76	.29	.89		65M	0	L636A
L636B	75.81	-.13	-.021	.015	1.05		67.41	1.16	1.16	.48	1.44		65M	0	L636B
L636C	76.72	.79	1.000	.013	.92		68.22	1.97	1.97	.24	.74		65M	0	L636C
L643	75.69	-.25	-.042	.015	1.05		68.06	1.81	1.81	.59	1.80		65N	0	L643
L673R	75.00	-.94	-1.000	.008	.50		64.64	-1.62	-1.61	.23	.70		65N	0	L673R
L692	76.19	.25	.041	.011	.81		67.26	1.01	1.01	.35	1.07		65N	0	L692
GR ₀ MEAN = 75.94 PERCENT															
SD MEANS = .60 PERCENT															
AVERAGE SDR = .14 PERCENT															
GRAND MEAN = 66.25 PERCENT															
SD OF MEANS = 1.00 PERCENT															
AVERAGE SDR = .33 PERCENT															
TEST DETERMINATIONS = 8															
28 LABS IN GRAND MEANS															
L105	75.99	.05	.000	.010	1.30		65.82	-.43	-.43	.12	.35		65T	+	L105
L213	76.39	.40	.074	.005	.80		66.51	.26	.26	.20	.59		65T	+	L213
L219	77.87	1.94	3.000	.030	2.000		66.81	2.56	2.56	.37	1.13		65P	+	L219
L223	77.17	1.24	2.004	.013	.92		67.99	1.73	1.73	.17	.52		65G	+	L223
L224	75.49	.55	.001	.020	1.41		66.94	.68	.68	.21	.65		65H	+	L224
L241	76.14	.20	.000	.022	1.09		65.37	-.88	-.88	.30	.91		65I	+	L241
L249	77.39	1.40	2.000	.014	.98		66.30	2.05	2.04	.12	.36		65P	+	L249
L256	75.30	-.64	-1.000	.019	1.34		64.66	-1.59	-1.59	.49	1.48		65H	+	L256
L259	75.84	-.10	-.017	.025	1.61		65.26	-.99	-.99	.38	1.16		65H	+	L259
L260	76.24	.30	.000	.018	1.27		66.84	.58	.58	.17	.51		65F	+	L260
L277	81.19	5.25	3.000	.020	1.87		77.94	11.68	11.67	1.40	4.24		65P	+	L277
L278	78.20	2.20	3.004	.000	.80		70.06	3.81	3.80	.05	.16		65P	+	L278
L301	76.60	.66	1.000	.021	1.49		66.14	-.12	-.12	.27	.82		65G	+	L301
L312	79.00	3.00	3.000	.000	.80		70.75	4.50	4.49	.27	.81		65P	+	L312
L328	73.04	2.10	3.000	.030	2.18		69.05	2.80	2.79	.14	.43		65P	+	L328
L380	78.00	2.00	3.001	.000	.80		72.25	6.00	5.99	.27	.81		65P	+	L380
L442	75.44	-.50	-.000	.007	.54		65.44	-.82	-.82	.32	.96		65T	+	L442
L456	75.39	-.53	-.001	.020	1.40		67.65	1.40	1.39	.25	.76		65P	+	L456
L562	80.00	4.00	6.000	.000	.80		74.00	7.75	7.74	.00	.00		65P	+	L562
L564	78.62	2.69	4.004	.002	3.73		70.12	3.87	3.87	.35	1.07		65P	+	L564
L587	77.06	1.12	1.000	.012	.80		66.64	.38	.38	.42	1.28		65I	+	L587
L617	77.75	1.81	3.000	.011	.77		68.72	2.47	2.47	.27	.82		65G	+	L617
L626	77.99	2.03	3.000	.004	.25		69.11	2.86	2.85	.32	.96		65P	+	L626
L684	75.35	-.59	-.000	.009	.87		72.55	6.30	6.29	.39	1.19		65H	+	L684
L695	78.00	2.06	3.001	.000	.80		69.00	2.75	2.74	.00	.00		65P	+	L695
L698	76.04	.10	.010	.012	.80		64.64	-1.42	-1.41	.21	.65		65I	+	L698
L704	77.67	1.94	3.000	.025	1.87		NO DATA REPORTED FOR SAMPLE B47						65P	+	L704
L711	76.94	1.00	1.000	.010	1.27		67.50	1.25	1.24	.38	1.15		65P	+	L711
TOTAL NUMBER OF LABORATORIES REPORTING = 50															
Best values: J98 76.0 ± 1.0 percent															
B47 66.1 ± 1.8 percent															

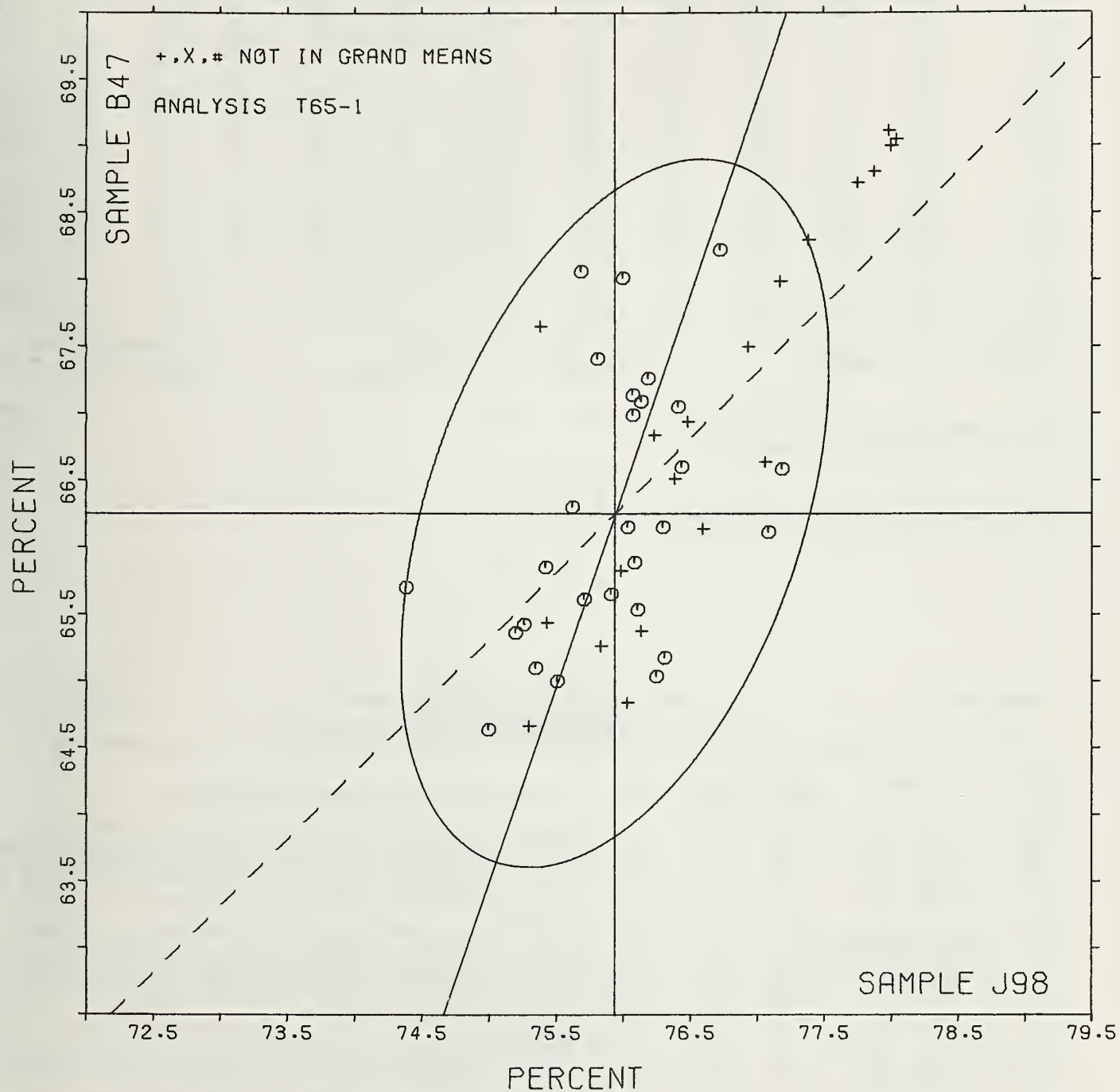
DIRECTIONAL BLUE REFLECTANCE IN PERCENT
TAPPI STANDARD T452 DS-77, 'BRIGHTNESS'; MARTIN SWEETS (ACBT & GE) IS STANDARD FOR THIS ANALYSIS

LAB CODE	F	MEANS J58 B47	COORDINATES ADJUA MINOR	AVG X000K VAM	PROPERTY---TEST INSTRUMENT---CONDITIONS
L176A	0	74.39 66.70	-1.03 1.29	1.17 65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L673R	0	75.00 64.64	-1.03 0.37	0.02 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L523	0	75.20 65.36	-1.00 0.41	0.00 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L210M	0	75.26 65.42	-1.00 0.37	1.00 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L256	+	75.30 64.66	-1.71 0.09	1.41 65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L684	+	75.35 72.55	0.77 2.09	0.93 65A	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L285	0	75.35 66.10	-1.24 0.19	1.09 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L456	+	75.39 67.65	1.14 0.97	1.11 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L275	0	75.42 65.85	-0.33 0.36	1.40 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L442	+	75.44 65.44	-0.94 0.21	0.70 65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L190C	0	75.51 65.00	-1.32 -0.00	0.71 65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L565	0	75.62 66.30	-0.30 0.31	0.05 65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L643	0	75.69 68.06	1.03 0.82	1.42 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L172	0	75.71 65.61	-0.00 0.01	0.07 65A	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (ACBT), S-2
L636B	0	75.81 67.41	1.00 0.49	1.25 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L259	+	75.84 65.26	-0.97 -0.22	1.48 65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L317	0	75.91 65.65	-0.38 -0.17	1.04 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L105	+	75.99 65.82	-0.39 -0.18	0.03 65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L636A	0	76.00 68.01	1.00 0.31	1.14 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L698	+	76.04 64.84	-1.31 -0.50	0.70 65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L288	0	76.04 66.15	-0.07 -0.13	1.26 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L108	0	76.07 67.14	0.00 0.10	0.01 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L315	0	76.07 66.95	0.74 0.11	1.70 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L210N	0	76.09 65.89	-0.30 -0.26	1.10 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L122	0	76.11 65.54	-0.02 -0.40	0.04 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L598	0	76.14 67.09	0.00 0.08	1.00 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L241	+	76.14 65.37	-0.77 -0.47	1.25 65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L692	0	76.19 67.26	1.03 0.09	0.44 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L260	+	76.24 66.84	0.00 -0.09	0.09 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L308	0	76.25 65.04	-1.00 -0.09	0.03 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L115	0	76.30 66.15	0.02 -0.37	0.71 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L132	0	76.31 65.17	-0.90 -0.70	0.92 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L213	+	76.39 66.51	0.09 -0.34	0.00 65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2M
L543	0	76.41 67.05	0.91 -0.19	1.25 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L211	0	76.44 66.60	0.49 -0.30	0.51 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L224	+	76.45 66.94	0.02 -0.30	1.03 65H	BLUE REFLECTANCE (DIRECTIONAL), HUNTER
L301	+	76.60 66.14	0.10 -0.00	1.10 650	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L636C	0	76.72 68.22	2.12 -0.11	0.03 65M	BLUE REFLECTANCE (DIRECTIONAL), MARTIN SWEETS (GE), S-1
L711	+	76.94 67.50	1.00 -0.34	1.21 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L587	+	77.06 66.64	0.73 -0.94	1.47 65T	BLUE REFLECTANCE (DIRECTIONAL), HUNTER D25D2A
L158	0	77.09 66.11	0.24 -1.13	0.00 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L223	+	77.17 67.99	2.04 -0.01	0.72 650	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L225	0	77.19 66.59	0.72 -1.07	1.03 65N	BLUE REFLECTANCE (DIRECTIONAL), TECHNIDYNE/DIANG/MO S ₀ , S-4
L249	+	77.39 68.30	2.40 -0.71	0.07 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L617	+	77.75 68.72	2.92 -0.51	0.00 650	BLUE REFLECTANCE (DIRECTIONAL), GARDNER
L704	+	77.87		1.07 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L219	+	77.87 68.81	3.05 -1.00	1.04 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L626	+	77.99 69.11	3.37 -1.01	0.01 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L380	+	78.00 72.25	6.34 -0.01	0.40 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L695	+	78.00 69.00	3.20 -1.06	0.00 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L328	+	78.04 69.05	3.32 -1.08	1.00 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L278	+	78.20 70.06	4.33 -0.91	0.00 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L564	+	78.62 70.12	4.33 -1.29	2.40 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L312	+	79.00 70.75	5.24 -1.44	0.40 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L562	+	80.00 74.00	6.04 -1.34	0.00 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
L277	+	81.19 77.94	12.75 -1.19	3.05 65P	BLUE REFLECTANCE (DIRECTIONAL), PHOTOVOLT
GMEANS:		75.94 66.25		1.00	
55% ELLIPSE:			2.70 1.40	WAVE GAMMA = 71 DEGREES	

BLUE REFLECTANCE, DIRECTIONAL

SAMPLE J98 = 75.9 PERCENT

SAMPLE B47 = 66.3 PERCENT



TAPPI SUGGESTED METHOD T-425 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE	PAMANTING					SAMPLE	RELEASE BASE					TEST D ₀ = 8		
	J98	89 GRAMS PER SQUARE METER					D47	82 GRAMS PER SQUARE METER					VAR	F	LAB
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR					
L121	760.04	0.40	0.00	0.12	10.08	660.52	20.05	20.61	0.12	0.58	65K	#	L121		
L136	760.39	0.70	10.24	0.12	10.09	660.58	0.51	0.65	0.25	10.20	65F	0	L136		
L150	740.83	-0.81	-10.33	0.12	10.10	660.30	-10.17	-10.49	0.15	0.71	65Q	0	L150		
L170	750.54	-0.10	-0.17	0.03	0.47	660.29	-0.18	-0.23	0.30	10.47	65B	0	L170		
L182	750.80	0.10	0.27	0.03	0.43	660.41	-0.06	-0.07	0.14	0.66	65F	0	L182		
L210K	760.18	0.54	0.00	0.09	0.84	670.40	0.93	10.19	0.28	10.35	65K	0	L210K		
L242	750.13	-0.51	-0.04	0.14	10.25	670.16	-0.32	-0.41	0.21	10.04	65F	0	L242		
L250T	750.61	-0.03	-0.03	0.10	0.91	660.41	-0.06	-0.07	0.14	0.66	65F	0	L250T		
L280	750.82	0.13	0.00	0.22	10.96	660.62	0.15	0.20	0.18	0.87	65Q	0	L280		
L313	760.15	0.51	0.04	0.10	0.94	670.18	0.71	0.91	0.14	0.66	65K	0	L313		
L325	760.96	10.32	20.10	0.07	0.03	660.37	10.90	20.42	0.26	10.27	65F	0	L325		
L349	740.50	-10.14	-10.07	0.12	10.06	660.01	-10.45	-10.85	0.15	0.73	65K	0	L349		
L446	750.26	-0.38	-0.03	0.09	0.80	660.02	-0.44	-0.57	0.17	0.84	65F	0	L446		
L573	750.84	0.20	0.03	0.10	10.43	660.36	-0.11	-0.14	0.25	10.19	65F	0	L573		
L575	750.56	-0.08	-0.13	0.12	10.09	660.42	-0.04	-0.06	0.35	10.67	65F	0	L575		
L598	750.35	-0.29	-0.41	0.09	0.61	660.10	-0.36	-0.46	0.13	0.63	65K	0	L598		
L680	750.30	-0.34	-0.30	0.13	10.17	660.44	-0.02	-0.03	0.22	10.06	65K	0	L680		

GR. MEAN = 75.64 PERCENT	GRAND MEAN = 66.47 PERCENT	TEST DETERMINATIONS = 8
SD MEANS = .61 PERCENT	SD OF MEANS = .79 PERCENT	16 LABS IN GRAND MEANS
AVERAGE SDR = .11 PERCENT		AVERAGE SDR = .21 PERCENT

L289	76.02	0.39	0.04	0.12	10.00	60.76	0.30	0.38	0.19	0.93	658	+ L289
TOTAL NUMBER OF LABORATORIES REPORTING = 18												
Best values: J98 75.6 $\pm$ 1.1 percent												
B47 66.5 $\pm$ 1.2 percent												

The following laboratories were omitted from the grand means because of extreme test results: 121.

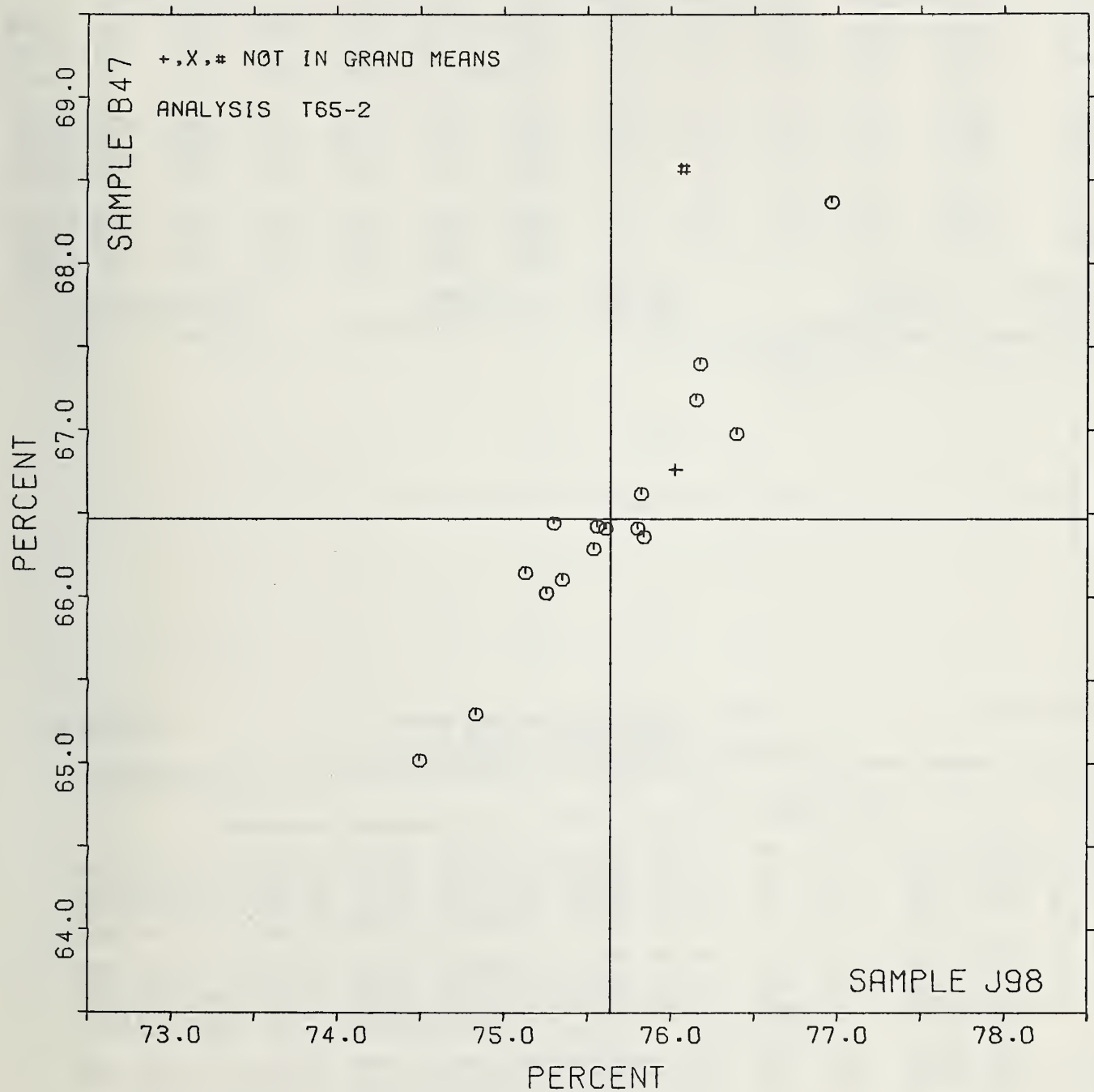
TAPPI SUGGESTED METHOD T202 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS			
		J98	B47	MAJOR	MINOR	X0 SUM	VAR				
L349	@	74.50	65.01	-1.84	.02	.090	.05K	DIFFUSE REFLECTANCE,	ELREPHO,	GLOTRAP,	MGO (ZEISS) BASE
L150	@	74.83	65.30	-1.42	-.07	.091	.05Q	DIFFUSE REFLECTANCE,	ELREPHO,	GLOTRAP,	ZEISS ABSOLUTE BASE
L242	@	75.13	66.14	-.08	.21	1.014	.05F	DIFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-PTB ABSOLUTE BASE
L446	@	75.26	66.02	-.059	.03	.092	.05F	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-PTB ABSOLUTE BASE
L680	@	75.30	66.44	-.23	.25	1.011	.05K	DIFFr USE REFLECTANCE,	ELKEPHO,	GLOTRAP,	MGO (ZEISS) BASE
L598	@	75.35	66.10	-.46	.01	.072	.05A	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	MGO (ZEISS) EASE
L170	@	75.54	66.29	-.20	-.03	.097	.05D	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NES ABSOLUTE BASE
L575	@	75.56	66.42	-.08	.04	1.008	.05F	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-PTB ABSOLUTE BASE
L250T	@	75.61	66.41	-.00	-.01	.079	.65F	DIFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-PTB ABSOLUTE BASE
L182	@	75.80	66.41	.00	-.16	.094	.05F	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-FTB ABSOLUTE BASE
L280	@	75.82	66.62	.23	-.05	1.041	.05Q	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	ZEISS ABSOLUTE BASE
L573	@	75.34	66.36	.04	-.22	1.031	.05F	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-PTB ABSOLUTE BASE
L289	*	76.02	66.76	.47	-.13	.099	.05D	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	SPECIFIC CALIBRATION
L121	#	76.04	68.52	1.07	.93	.093	.65A	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	MGO (ZEISS) BASE
L313	@	76.15	67.18	.00	.03	.090	.65A	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	MGO (ZEISS) BASE
L21OK	@	76.18	67.40	1.07	.14	1.040	.05K	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	MGO (ZEISS) BASE
L136	@	76.39	66.58	.07	-.29	1.014	.05F	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-PTB ABSOLUTE BASE
L325	@	76.96	68.37	2.02	.10	.096	.65F	DIFFr USE REFLECTANCE,	ELREPHO,	GLOTRAP,	NRC-PTB ABSOLUTE BASE
GMEANS:		75.64	66.47			1.000					
		5% ELLIPSE:		2.70	.41			WITH GAMMA = 52 DEGREES			

BLUE REFLECTANCE, DIFFUSE, WITH TRAP

SAMPLE J98 = 75.6 PERCENT

SAMPLE B47 = 66.5 PERCENT



ANALYSIS T65-3 TABLE 1

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

TAPPI SUGGESTED METHOD 1525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	SAMPLE J98		PAINTING 89 GRAMS PER SQUARE METER				SAMPLE B47	RELEASE BASE 82 GRAMS PER SQUARE METER				TEST D ₀ = 8		
	MEAN	DEV	N ₀ DEV	SDR	Δ ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L152	76.20	-0.40	-0.53	0.09	1.02		67.76	-0.35	-0.53	0.21	1.09	65E	0	L152
L157	76.92	0.20	0.34	0.09	1.00		68.37	0.26	0.39	0.26	1.37	65E	0	L157
L161	77.06	0.40	0.53	0.09	0.99		69.47	1.36	2.05	0.20	1.04	65E	0	L161
L194	76.41	-0.25	-0.33	0.11	1.22		67.76	-0.35	-0.53	0.17	0.89	65E	0	L194
L219	77.17	0.51	1.07	0.09	1.00		66.52	0.41	0.62	0.12	0.61	65E	0	L219
L241	76.91	0.25	0.32	0.13	1.73		67.52	-0.59	-0.88	0.15	0.78	65E	0	L241
L244	76.97	0.31	0.60	0.17	1.98		63.43	0.32	0.48	0.32	1.68	65D	0	L244
L251	76.81	0.15	0.31	0.03	0.59		68.05	-0.06	-0.69	0.21	1.09	65E	0	L251
L309	77.19	0.53	1.11	0.09	1.03		66.76	0.65	0.98	0.14	0.72	65J	0	L309
L360	77.06	0.40	0.53	0.14	1.50		66.82	0.71	1.07	0.29	1.51	65E	0	L360
L384	76.65	-0.01	-0.32	0.05	0.02		66.00	-0.11	-0.16	0.13	0.69	65S	0	L384
L484	75.77	-0.89	-1.00	0.03	0.01		66.91	-1.20	-1.80	0.22	1.14	65E	0	L484
L565	75.90	-0.70	-1.01	0.00	0.00		67.60	-0.51	-0.76	0.19	0.98	65W	0	L565
L685	76.25	-0.41	-0.53	0.03	0.53		67.55	-0.56	-0.84	0.08	0.40	65E	0	L685

GR₀ MEAN = 76.66 PERCENT

GRAND MEAN = 66.11 PERCENT

TEST DETERMINATIONS = 8

SD MEANS = 0.47 PERCENT

SD OF MEANS = 0.06 PERCENT

14 LABS IN GRAND MEANS

AVERAGE SDR = 0.09 PERCENT

AVERAGE SDR = 0.19 PERCENT

TOTAL NUMBERS OF LABORATORIES REPORTING = 14

Best values: J98 76.7 ± 0.8 percent

B47 68.1 ± 1.2 percent

ANALYSIS T65-3 TABLE 2

DIFFUSE BLUE REFLECTANCE IN PERCENT (NO GLOSS TRAP)

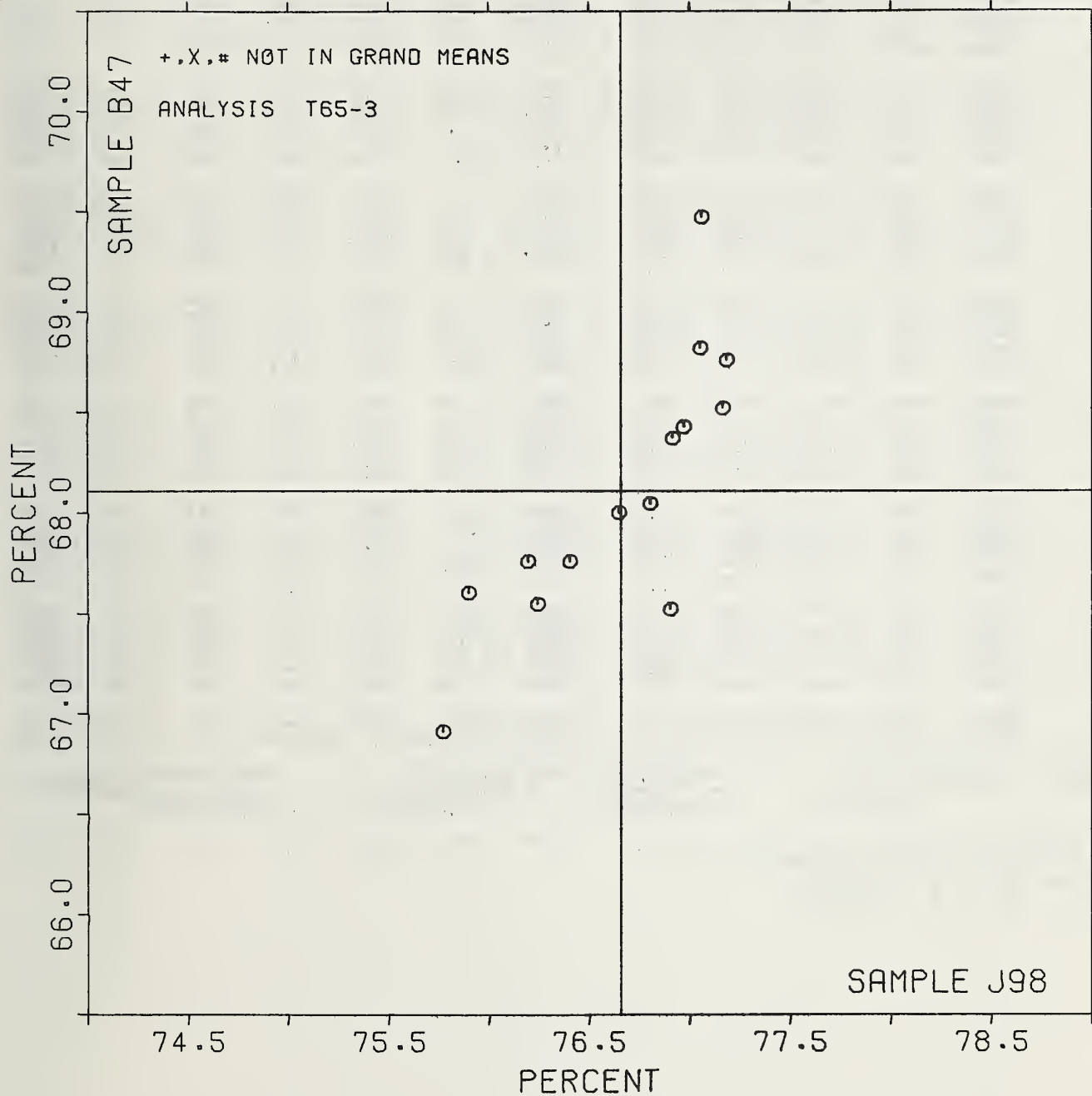
TAPPI SUGGESTED METHOD 1525 SU-72, BRIGHTNESS OF PULP (DIFFUSE ILLUMINATION AND 0 DEG. OBSERVATION)

LAB CODE	F	MEANS		COORDINATES		AVJ	PROPERTIES		TEST INSTRUMENT		CONDITIONS	
		J98	B47	MAJOR	MINOR		R ₀ SDR	VAR				
L484	0	75.77	66.91	-1.49	0.08	0.08	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L565	0	75.90	67.60	-0.84	0.35	0.49	0.5W	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, NDS MGO BASE				
L152	0	76.20	67.76	-0.53	0.19	1.00	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L685	0	76.25	67.55	-0.70	0.04	0.40	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L194	0	76.41	67.76	-0.43	0.02	1.00	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L384	0	76.65	66.00	-0.10	-0.05	0.05	0.5S	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, ABSOLUTE-UNKNOWN BASE				
L251	0	76.81	68.05	0.03	-0.10	0.04	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L241	0	76.91	67.52	-0.33	-0.53	1.20	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L157	0	76.92	68.37	0.30	-0.07	1.22	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L244	0	76.97	68.43	0.44	-0.08	1.03	0.5D	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, NTC-PIB ABSOLUTE				
L360	0	77.06	68.82	0.81	0.06	1.50	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L161	0	77.06	69.47	1.30	0.42	1.02	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L219	0	77.17	68.52	0.02	-0.20	0.04	0.5E	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, MGO (ZEISS) BASE				
L309	0	77.19	68.76	0.43	-0.08	0.06	0.5J	DIFFUSE REFLECTANCE, ELREPH0, NO TRAP, NES ABSOLUTE				
GMEANS:		76.66	68.11			1.00						
		95% ELLIPSE:		20.27	0.08			WAIN GAMMA = 50 DEGREES				

BLUE REFLECTANCE, DIFFUSE, NO TRAP

SAMPLE J98 = 76.7 PERCENT

SAMPLE B47 = 68.1 PERCENT



ANALYSIS T75-1 TABLE 1
 SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE
 TAPPI OFFICIAL TEST METHOD T480 G3-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	SAMPLE E87	OFFSET ENAMEL COATING 117 GRAMS PER SQUARE METER				SAMPLE E47	COATED GLOSS 91 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L108	67.7	-1.1	-3.40	.04	.23	63.0	-0.7	-0.36	.06	.39	75H	0	L108
L121	68.0	-0.8	-3.30	1.07	.93	62.3	-1.3	-0.71	1.4	.87	75H	0	L121
L122	69.4	.7	0.29	2.1	1.19	64.1	.5	.24	1.2	.73	75H	0	L122
L132	71.9	3.2	1.01	1.4	.76	66.9	3.2	1.72	1.3	.82	75G	0	L132
L172	63.5	-5.3	-2.03	2.3	1.28	59.7	-3.9	-2.08	1.8	1.10	75H	0	L172
L189	69.0	.2	0.09	1.0	.67	64.8	1.2	.62	1.5	.94	75P	0	L189
L190C	67.3	-1.0	-0.09	1.0	.96	61.1	-2.5	-1.36	2.7	1.61	75G	0	L190C
L190R	70.5	1.7	.70	1.4	.78	63.8	.1	.07	1.8	1.12	75G	0	L190R
L206	69.4	.0	0.23	2.4	1.32	64.9	1.3	.68	1.6	.98	75H	0	L206
L210	72.8	4.0	1.04	1.0	.87	67.0	3.3	1.78	1.7	1.02	75H	0	L210
L211	68.3	-0.3	-3.23	2.3	1.40	64.1	.4	.23	2.0	1.21	75H	0	L211
L230	69.6	.8	.30	2.3	1.27	64.0	1.0	.51	2.0	1.18	75H	0	L230
L251	68.8	.1	.02	2.3	1.30	63.2	-0.4	-0.21	1.9	1.17	75G	0	L251
L256	72.1	3.3	1.07	1.0	.68	66.4	2.8	1.50	1.7	1.06	75H	0	L256
L262	69.0	.2	.09	1.7	.93	64.1	5.5	2.91	1.2	.72	75K	X	L262
L277A	69.8	1.0	.47	1.0	.91	63.6	-0.7	-0.36	1.9	1.16	75H	0	L277A
L277B	68.6	-0.2	-3.10	1.9	1.65	64.5	.8	.44	1.4	.82	75H	0	L277B
L278	60.7	-2.1	-0.93	1.0	.82	62.1	-1.5	-0.79	1.4	.87	75G	0	L278
L279	60.5	-2.3	-1.02	1.4	.70	61.8	-1.8	-0.98	2.1	1.27	75G	0	L279
L291	71.1	2.4	1.03	1.0	.90	66.1	2.4	1.30	2.2	1.31	75H	0	L291
L301	64.4	-4.4	-1.00	1.3	.74	70.6	6.9	3.70	1.5	.88	75H	X	L301
L317	70.8	2.0	.89	1.3	.82	65.5	1.9	.99	1.3	.77	75H	0	L317
L323	69.9	1.1	.40	1.0	.92	63.8	.2	.10	1.3	.81	75H	0	L323
L349	68.7	-0.1	-0.03	2.3	1.39	62.3	-1.4	-0.73	1.9	1.13	75H	0	L349
L388	63.6	-5.2	-2.02	1.0	.68	59.7	-3.9	-2.10	2.0	1.20	75P	0	L388
L483	70.3	1.0	.09	.8	.45	63.6	-0.0	-0.03	2.3	1.42	75H	0	L483
L564	70.3	1.0	.07	1.9	1.09	61.2	-2.4	-1.30	.4	.25	75P	X	L564
L573	68.0	-0.8	-0.33	2.8	1.58	63.7	.1	.03	1.7	1.03	75G	0	L573
L574	60.4	-2.3	-1.00	3.3	1.84	61.6	-2.6	-1.41	1.5	.91	75G	0	L574
L587	70.3	1.0	.07	2.0	1.12	65.8	2.2	1.15	1.2	.74	75H	0	L587
L592	71.0	2.2	.07	1.0	1.01	65.4	1.8	.93	1.4	.87	75H	0	L592
L598	64.7	-0.1	-1.00	1.0	.51	62.0	-1.6	-0.87	.9	.52	75H	0	L598
L643	70.9	2.1	.03	1.0	.90	64.8	1.2	.62	1.8	1.09	75H	0	L643
L668	67.6	-1.2	-0.33	1.8	1.00	63.5	-0.1	-0.08	1.9	1.15	75G	0	L668
L670	68.8	.1	.02	1.3	.73	63.5	-0.2	-0.10	1.6	.98	75H	0	L670
L697	68.0	-0.8	-0.37	1.3	.83	62.2	-1.5	-0.78	1.2	.74	75H	0	L697
L704	71.0	2.2	.30	2.7	1.49	NO DATA REPORTED FOR SAMPLE E47					75P	X	L704
GR. MEAN = 68.8 GLOSS UNITS GRAND MEAN = 63.6 GLOSS UNITS TEST DETERMINATIONS = 10													
SD MEANS = 2.2 GLOSS UNITS SD OF MEANS = 1.9 GLOSS UNITS 33 LABS IN GRAND MEANS													
AVERAGE SDR = 1.0 GLOSS UNITS AVERAGE SDR = 1.7 GLOSS UNITS													

TOTAL NUMBER OF LABORATORIES PARTICIPATING = 38

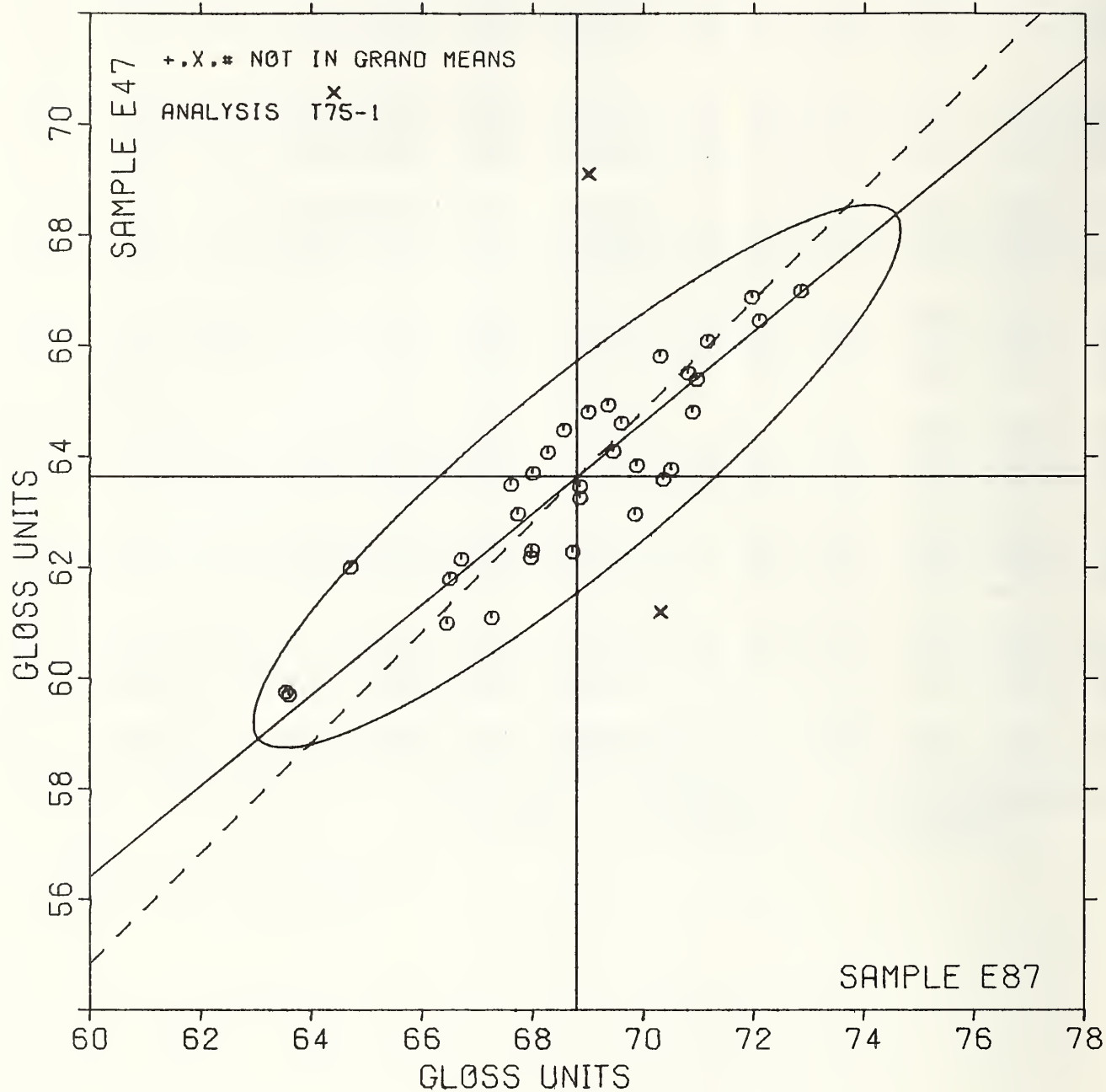
Best values: E87 69 $\pm$ 4 gloss units
 E47 64 $\pm$ 3 gloss units

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - HIGH RANGE
TAFFI OFFICIAL TEST METHOD T480 03-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		E67	E47	MAJOR	MINOR	MAJOR	VAR			
L250	*	61.2	53.7	-12.2	-2.9	0.99	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT, 20C, 65%RH
L172	0	63.5	59.7	-0.5	0.3	1.019	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L388	0	63.6	59.7	-0.5	0.3	1.004	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L304	X	64.4	70.6	1.0	0.1	0.01	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L598	0	64.7	62.0	-4.2	1.3	0.72	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, BAUSCH + LOMB
L574	0	66.4	61.0	-3.5	-0.6	1.037	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L275	0	66.5	61.6	-2.9	0.0	1.001	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L278	0	66.7	62.1	-2.0	0.2	0.04	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L190C	0	67.3	61.1	-2.3	-1.0	1.030	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L669	0	67.6	63.5	-1.0	0.0	1.008	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L108	0	67.7	63.0	-1.3	0.2	0.01	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L657	0	68.0	62.2	-1.0	-0.6	0.00	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L121	0	68.0	62.3	-1.0	-0.3	0.00	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L573	0	68.0	63.7	-0.0	0.6	1.000	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L211	0	68.3	64.1	-0.1	0.7	1.031	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L277B	0	68.6	64.5	0.3	0.8	0.93	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L349	0	68.7	62.3	-0.9	-1.0	1.020	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L670	0	68.8	63.5	-0.1	-0.2	0.00	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L251	0	68.8	63.2	-0.2	-0.3	1.024	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L189	0	69.0	64.8	0.9	0.8	0.90	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L262	X	69.0	69.1	3.0	4.1	0.04	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GAERTNER (K-C TYPE)
L206	0	69.4	64.9	1.2	0.6	1.015	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L122	0	69.4	64.1	0.0	-0.1	0.96	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L230	0	69.6	64.6	1.2	0.2	1.022	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L277A	0	69.8	63.0	0.4	-1.2	1.004	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L323	0	69.9	63.8	1.0	-0.5	0.06	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L587	0	70.3	65.8	2.0	0.7	0.93	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L564	X	70.3	61.2	-0.4	-2.8	0.07	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L483	0	70.3	63.6	1.2	-1.0	0.94	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L190R	0	70.5	63.8	1.4	-1.0	0.95	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L317	0	70.8	65.5	2.7	0.2	0.06	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L643	0	70.9	64.8	2.3	-0.4	1.000	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L592	0	71.0	65.4	2.0	-3.0	0.94	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L704	M	71.0				1.049	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, PHOTOVOLT
L291	0	71.1	66.1	3.4	0.4	1.011	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L132	0	71.9	66.9	4.0	0.5	0.75	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, GARDNER
L256	0	72.1	66.4	4.0	0.1	1.002	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
L210	0	72.3	67.0	5.2	0.0	0.94	75.0	SPECULAR	GLOSS, 75 DEGREE,	50-95 UNITS, HUNTER
GMEANS:		68.8	63.6			1.000				
95% ELLIPSE:				7.4	1.0			WIND GAMMA = 39 DEGREES		

SPECULAR GLOSS, 75 DEGREE-HIGH RANGE

SAMPLE E87 = 68.8 GLOSS UNITS SAMPLE E47 = 63.6 GLOSS UNITS



ANALYSIS T76-1 TABLE 1

SPECULAR GLOSS AT 75 DEGREES, IN GLOSS UNITS - LOW RANGE

TAPPI OFFICIAL TEST METHOD T480-93-78. SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	SAMPLE	MACHINE COATED DULL					SAMPLE	PRINTING					TEST D ₀ = 10		
	G05	116 GRAMS PER SQUARE METER					E78	116 GRAMS PER SQUARE METER					VAR	F	LAB
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR					
L122	36.74	-1.18	-0.00	.93	.77	50.47	-0.54	-0.94	.28	.95	76H	Ø	L122		
L128	36.00	-1.92	-1.00	.94	.78	50.20	.019	.33	.42	1.42	76G	Ø	L128		
L134	37.30	-.62	-0.00	1.00	.87	50.00	-0.01	-0.02	.47	1.59	76H	Ø	L134		
L136	40.98	3.00	1.00	1.00	.88	50.58	.97	1.69	.36	1.20	76G	Ø	L136		
L149	34.30	-3.62	-1.50	1.49	1.23	50.00	-0.01	-0.02	.00	.00	76G	Ø	L149		
L153	40.45	2.53	1.00	.80	.66	40.90	-1.11	-1.94	.32	1.07	76G	*	L153		
L162	40.83	2.91	1.07	1.10	.90	70.40	1.39	2.42	.39	1.33	76G	Ø	L162		
L182	38.05	.13	.07	1.47	1.22	50.79	-0.22	-0.38	.28	.95	76H	Ø	L182		
L210	39.72	1.80	.67	.90	.78	50.34	.33	.58	.29	.98	76H	Ø	L210		
L213	38.07	.15	.00	1.01	1.03	50.68	-0.33	-0.58	.28	.95	76H	Ø	L213		
L223	36.90	-1.02	-0.00	1.38	1.14	50.78	-0.23	-0.40	.30	1.01	76H	Ø	L223		
L226	37.51	-.41	-0.00	1.00	1.07	50.91	-0.10	-0.17	.27	.90	76H	Ø	L226		
L259	38.30	.38	.00	.74	.69	50.11	.10	.17	.19	.64	76H	Ø	L259		
L288	35.87	-2.00	-1.10	.82	.66	50.63	-0.38	-0.66	.29	.97	76H	Ø	L288		
L317	37.70	-.22	-0.10	1.70	1.41	50.90	-0.11	-0.19	.32	1.07	76H	Ø	L317		
L328	38.62	.70	.00	.88	.73	100.27	4.26	7.43	.31	1.04	76H	#	L328		
L456	37.96	.04	.00	1.40	1.17	50.07	.06	.10	.31	1.04	76H	Ø	L456		
L713	38.32	.40	.00	.58	.48	50.33	3.32	5.79	.52	1.75	76H	#	L713		

GR. MEAN = 37.92 GLOSS UNITS

SD MEANS = 1.86 GLOSS UNITS

GRAND MEAN = 60.01 GLASS UNITS

NO. OF MEANS = 857 GROSS UNITS

TEST DETERMINATIONS = 10

16 LABS IN GRAND MEANS

AVeRAGe sUz = 1041 GROSS UNITS

AVERAGE SDR = .30 GLASS UNITS

1250	36.30	-1.62	-0.07	0.07	0.50	0.10	0.09	0.16	0.21	0.71	760	* 1250
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TOTAL NUMBER OF LABORATORIES REPORTING - 19

Best values: G05 38 + 3 gross units

E78	6	+	1	gross units
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The following laboratories were omitted from the grand means because of extreme test results: 328, 713.

ANALYSIS T76-1 TABLE 2

SPECULAR GLOSS at 75 DEGREES, IN GLOSS UNITS - LOW RANGE

TAPPI OFFICIAL TEST METHOD T480 G3-78, SPECULAR GLOSS OF PAPER AND PAPERBOARD AT 75 DEGREES

LAB CODE	F	MEANS		COORDINATES		AVG NO. SUR	VAR	PROPERTY--TEST INSTRUMENT--CONDITIONS						
		GOS	E78	ALPHA	LINOS			SPECULAR	GLASS	75	DEGREE	20-65	UNITS	GARDNER
L149	@	34.30	6.00	-3.59	0.45	1.02	76G	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	GARDNER
L288	@	35.87	5.63	-2.08	-0.11	1.02	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L128	@	36.00	6.02	-1.58	0.43	1.10	76G	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	GARDNER
L250	+	36.30	6.10	-1.59	0.30	1.05	76G	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	PHOTOVOLT, 20C, 65%RH
L122	@	36.74	5.47	-1.24	-0.38	1.00	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L223	@	36.90	5.78	-1.04	-0.10	1.08	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L134	@	37.30	6.00	-0.61	0.07	1.03	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L226	@	37.51	5.91	-0.42	-0.05	1.05	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L317	@	37.70	5.90	-0.23	-0.08	1.04	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L456	@	37.96	6.07	0.05	0.05	1.01	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L182	@	38.05	5.79	0.10	-0.24	1.00	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L213	@	38.07	5.68	0.11	-0.35	1.04	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L259	@	38.30	6.11	0.39	0.05	1.05	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L713	#	38.32	9.33	0.05	0.24	1.12	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L328	#	38.62	10.27	1.24	0.13	1.08	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L210	@	39.72	6.34	1.05	0.10	1.08	76H	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	HUNTER
L153	*	40.45	4.90	2.37	-1.43	1.00	76G	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	GARDNER
L162	@	40.83	7.40	3.07	1.00	1.15	76G	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	GARDNER
L136	@	40.98	6.98	3.10	0.57	1.04	76G	SPECULAR	GLASS	75	DEGREE	20-65	UNITS	GARDNER

GMEANS: 37.92 6.01

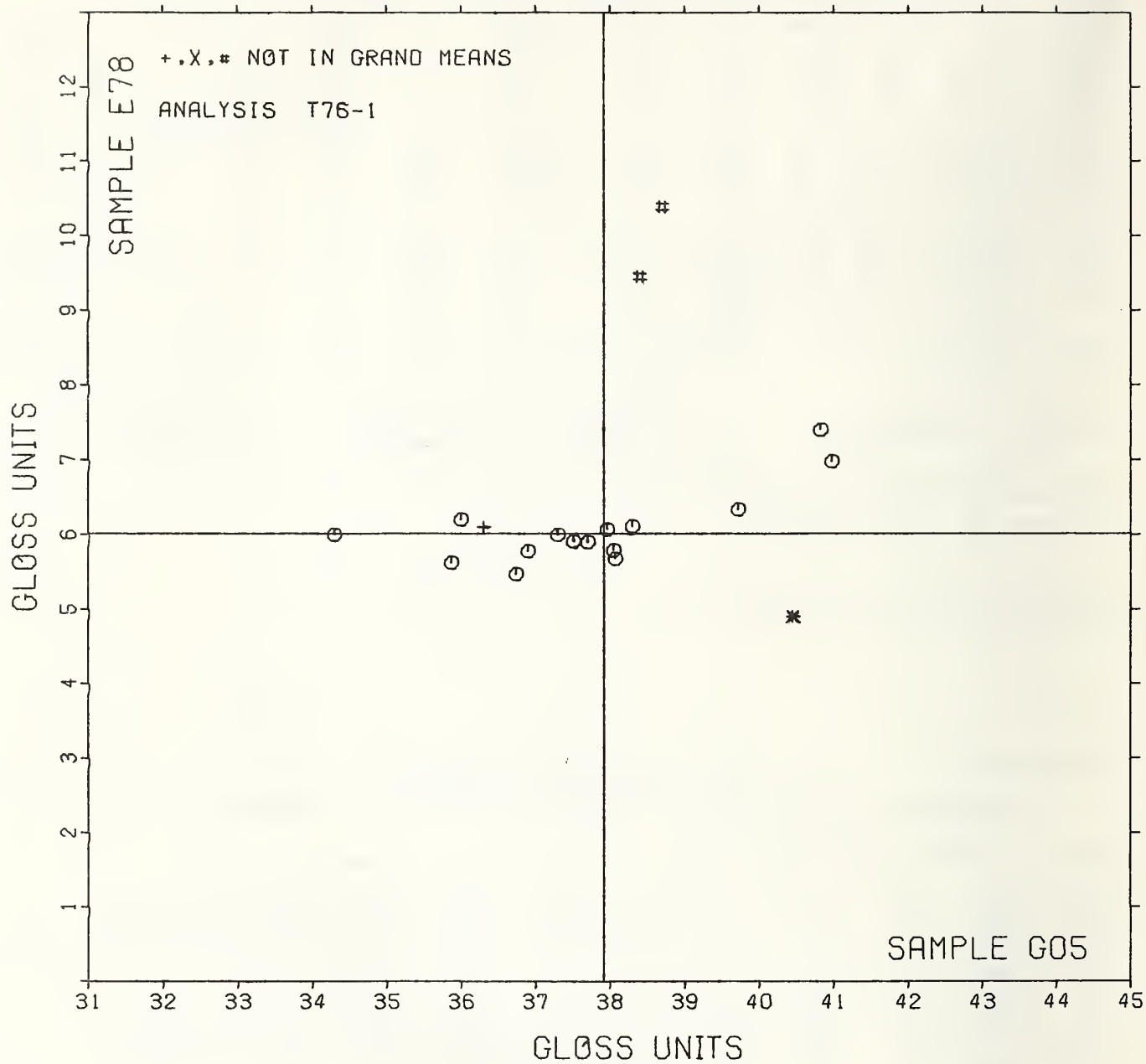
95% ELLIPSE:

1960

WIND GAMMA = 7 DEGREES

SPECULAR GLOSS, 75 DEGREE-LOW RANGE

SAMPLE G05 = 37.9 GLOSS UNITS SAMPLE E78 = 6.0 GLOSS UNITS



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI OFFICIAL TEST METHOD T411 OS-76

SEPTEMBER 1979

LAB CODE	SAMPLE J82 73 GRAMS PER SQUARE METER					SAMPLE J22 89 GRAMS PER SQUARE METER					TEST D ₀ = 10		
	MEAN	DEV	NO DEV	SDR	RO SDR	MEAN	DEV	NO DEV	SDR	RO SDR	VAP	F	LAB
L105	2.732	.032	.44	.027	.68	3.046	.028	.35	.029	.52	9CT	8	L105
L118	2.705	.005	.07	.032	.61	3.028	.010	.13	.024	.43	9CQ	8	L118
L122	2.727	.027	.37	.045	1.15	3.034	.016	.20	.088	1.57	9CV	8	L122
L123F	2.675	.175	2.42	.020	.67	3.195	.177	2.19	.112	1.99	9CF	8	L123F
L125	2.056	-.044	-.01	.052	1.31	3.025	.007	.09	.056	1.01	9CT	8	L125
L128	2.091	-.009	-.12	.031	.60	2.990	-.028	-.34	.037	.65	9CT	8	L128
L141	2.626	-.074	-1.02	.025	.63	2.954	-.064	-.78	.064	1.14	90T	8	L141
L153	2.830	.130	1.00	.045	1.69	3.153	.135	1.67	.063	1.13	90T	8	L153
L158	2.630	-.070	-.77	.048	1.22	2.990	-.028	-.34	.057	1.01	90T	8	L158
L159	2.720	.020	.20	.025	.63	3.072	.054	.67	.064	1.14	90T	8	L159
L162	2.557	-.143	-1.55	.052	.81	2.899	-.119	-1.46	.029	.51	90V	8	L162
L166	2.703	.003	.00	.042	1.05	2.960	-.058	-.71	.058	1.03	90T	8	L166
L172	2.681	-.019	-.20	.052	1.30	3.006	-.012	-.14	.044	.79	90T	8	L172
L174	2.600	-.100	-1.05	.047	1.19	2.980	-.038	-.46	.063	1.13	90T	8	L174
L182	2.715	.015	.20	.050	1.52	3.002	-.015	-.19	.098	1.75	90L	8	L182
L183	2.652	-.048	-.00	.029	.74	2.971	-.047	-.57	.034	.61	90T	8	L183
L190C	2.700	-.003	-.00	.007	1.09	2.910	-.108	-1.33	.074	1.32	90T	*	L190C
L203A	2.630	-.070	-.77	.048	1.22	2.910	-.108	-1.33	.110	1.96	90T	8	L203A
L203C	2.805	.105	1.05	.057	.95	3.050	.032	.40	.088	1.57	90T	8	L203C
L212	2.690	-.010	-.14	.040	1.10	3.050	.032	.40	.047	.84	90T	8	L212
L213	2.680	-.020	-.20	.042	1.07	2.950	-.068	-.83	.053	.94	90T	8	L213
L223	2.648	-.052	-.72	.052	.80	2.904	-.054	-.66	.030	.53	90V	8	L223
L228	2.700	-.000	-.00	.052	2.07	2.990	-.028	-.34	.099	1.77	90T	8	L228
L233	2.797	.097	1.04	.051	1.28	3.124	.106	1.31	.042	.75	90Q	8	L233
L241	2.780	.080	1.11	.071	1.81	3.095	.077	.96	.044	.78	90T	8	L241
L242P	2.742	.042	.50	.035	.84	3.073	.056	.69	.037	.66	90P	8	L242P
L249	2.671	-.029	-.40	.040	1.23	3.030	.012	.15	.047	.84	90P	8	L249
L259	2.682	-.018	-.20	.025	.58	2.967	-.051	-.62	.014	.25	90T	8	L259
L260	2.751	.051	.71	.050	1.27	3.093	.075	.93	.032	.56	90Q	8	L260
L261	2.744	.044	.64	.019	.48	3.022	.004	.06	.035	.62	90T	8	L260
L261	2.722	.022	.50	.047	1.20	3.034	.016	.20	.038	.67	90T	8	L261
L262	2.670	-.030	-.41	.020	.65	2.975	-.043	-.52	.042	.76	90T	8	L262
L291	2.801	.101	1.00	.025	.63	3.156	.138	1.71	.043	.77	90T	8	L291
L305	2.700	-.000	-.00	.041	1.03	3.000	.042	.52	.070	1.25	9CT	8	L305
L309	2.650	-.050	-.05	.055	1.55	2.990	-.028	-.34	.057	1.01	9CT	8	L309
L315	2.670	-.030	-.41	.067	1.71	3.090	.072	.89	.057	1.01	9CT	8	L315
L318	2.615	-.085	-1.10	.024	.61	2.875	-.143	-1.76	.092	1.64	90T	8	L318
L320	2.590	-.110	-1.32	.021	.53	2.640	-.178	-2.19	.039	.70	90T	8	L320
L323	2.805	.105	1.05	.051	1.28	3.159	.141	1.74	.069	1.23	9CT	8	L323
L324	2.720	.020	.20	.035	.69	3.055	.037	.46	.050	.89	90T	8	L324
L326	2.748	.048	.50	.034	.86	3.051	.033	.41	.043	.76	90T	8	L326
L328	2.711	.011	.10	.039	1.00	3.021	.003	.04	.077	1.38	90T	8	L328
L333	2.645	-.055	-.70	.045	1.08	2.951	-.067	-.82	.044	.79	9CV	8	L333
L339	2.698	-.002	-.00	.041	1.05	2.990	-.028	-.34	.058	1.04	90T	8	L339
L341	2.806	.106	1.07	.040	1.02	3.128	.110	1.36	.020	.35	90T	8	L341
L352	2.743	.043	.50	.021	.55	3.036	.018	.23	.045	.79	90Q	8	L352
L356	2.649	-.051	-.71	.023	.59	2.930	-.088	-1.08	.039	.69	90T	8	L356
L358	2.665	-.035	-.40	.071	1.80	2.982	-.036	-.44	.039	.69	90T	8	L358
L376	2.650	-.140	-1.54	.052	.60	2.920	-.098	-1.20	.048	.86	90T	8	L376
L380	2.786	.086	1.15	.025	.58	2.965	-.053	-.65	.041	.73	90T	X	L380
L382	2.863	.163	2.20	.029	.75	3.142	.124	1.53	.054	.96	9CT	8	L382
L390	2.640	-.060	-.60	.032	.60	2.965	-.053	-.65	.047	.85	90T	8	L390
L442	2.837	.137	1.00	.022	.56	3.148	.130	1.61	.032	.58	90V	8	L442
L556	2.718	.018	.20	.029	.74	3.117	.059	1.23	.042	.75	90T	8	L556
L557	2.715	.015	.21	.047	1.20	2.945	-.073	-.89	.080	1.42	9CT	8	L557
L567	2.717	.017	.24	.057	.94	3.057	.039	.49	.039	.70	9CV	8	L567
L571	2.670	-.030	-.41	.048	1.22	2.960	-.058	-.71	.070	1.25	9CV	8	L571
L574	2.545	-.155	-2.14	.042	1.06	2.651	-.167	-2.05	.031	.56	9CV	8	L574
L575	2.662	-.038	-.50	.030	.90	2.987	-.031	-.38	.036	.64	90T	8	L575
L576	2.701	.001	.01	.051	.60	3.103	.085	1.05	.286	5.11	90T	8	L576
L581	2.755	.055	.70	.028	.72	3.115	.097	1.20	.063	1.12	90T	8	L581
L587	2.640	-.060	-.60	.052	1.31	3.010	-.008	-.09	.032	.56	90T	8	L587
L626	2.589	-.111	-1.55	.040	1.17	2.867	-.151	-1.86	.050	.90	90T	8	L626
L704	2.585	-.115	-1.55	.053	1.59	NO DATA REPORTED FOR SAMPLE J22					90T	M	L704
L713	2.760	.060	.60	.032	.80	3.060	.042	.52	.046	.82	90T	8	L713

GR₀ MEAN = 2.700 MILS

SD MEANS = .072 MILS

AVERAGE SDR = .039 MILS

GR₀ MEAN = 68.58 MICROMETER

GRAND MEAN = 3.016 MILS

SD OF MEANS = .061 MILS

GRAND MEAN = 70.64 MICROMETER

TEST DETERMINATIONS = 10

63 LABS IN GRAND MEANS

AVERAGE SDR = .056 MILS

TAPPA COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 1
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPA OFFICIAL TEST METHOD T411 GS-76

SEPTEMBER 1979

LAB CODE	SAMPLE J82		PRINTING 73 GRAMS PER SQUARE METER				SAMPLE J22		PRINTING 89 GRAMS PER SQUARE METER				TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		VAR	F	LAB
L106	2.780	.084	1.11	.003	1.00		2.990	-.028	-.34	.032	.56	90C	*		L106
L108	2.895	.195	2.70	.010	.49		3.005	-.013	-.15	.060	1.07	90C	*		L108
L185	2.780	.080	1.11	.042	1.07		3.140	.122	1.51	.070	1.25	90B	*		L185
L203B	2.520	-.180	-2.44	.003	1.00		2.880	-.138	-1.69	.079	1.41	90C	*		L203B
L251	2.675	-.025	-.34	.012	.32		2.979	-.039	-.48	.028	.49	90W	*		L251
L285	2.648	.148	2.03	.008	2.23		3.128	.110	1.36	.041	.74	90X	*		L285
L342	2.809	-.091	-1.20	.030	.90		2.901	-.117	-1.44	.047	.83	90U	*		L342
L344	2.840	-.060	-.83	.070	1.77		2.970	-.048	-.59	.048	.86	90U	*		L344
L484	2.724	.024	.34	.041	1.03		2.984	-.033	-.41	.041	.73	90E	*		L484
L563	2.760	.060	.83	.032	1.31		3.050	.032	.40	.085	1.52	90U	*		L563
L616	2.644	-.056	-.77	.033	.89		3.024	.006	.08	.066	1.18	90C	*		L616
L684	2.760	.060	.83	.032	1.31		3.030	.012	.15	.067	1.20	90U	*		L684
TOTAL NUMBER OF LABORATORIES REPORTING = 77															

Best values: J82 2.70 ± 0.11 mils
J22 3.02 ± 0.15 mils

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI OFFICIAL TEST METHOD T411 OS-76

SEPTEMBER 1979

LAB CODE	F	MEANS J82	J22	COORDINATES MAJOR	MINOR	AVG R502	VAR	PROPERTY--TEST INSTRUMENT--CONDITIONS
L203B	*	2.520	2.580	-0.222	0.045	1.050	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L574	0	2.545	2.551	-0.227	0.007	0.51	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L162	0	2.557	2.559	-0.183	0.030	0.66	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L376	0	2.560	2.920	-0.100	0.041	0.03	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L704	M	2.585				1.059	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L626	0	2.589	2.867	-0.100	-0.010	1.013	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L320	0	2.590	2.840	-0.200	-0.034	0.02	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L174	0	2.600	2.980	-0.094	0.051	1.010	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L342	*	2.609	2.901	-0.148	-0.008	0.07	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L318	0	2.615	2.875	-0.103	-0.030	1.013	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L141	0	2.620	2.954	-0.097	0.014	0.05	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L158	0	2.630	2.990	-0.007	0.035	1.012	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L203A	0	2.630	2.910	-0.127	-0.018	1.059	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L390	0	2.640	2.965	-0.079	0.011	0.02	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L344	*	2.640	2.970	-0.075	0.014	1.052	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L587	0	2.640	3.010	-0.045	0.040	0.94	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L616	*	2.644	3.024	-0.032	0.040	1.003	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN
L333	0	2.645	2.951	-0.086	-0.002	0.93	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L223	0	2.648	2.964	-0.075	0.004	0.66	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L356	0	2.649	2.930	-0.099	-0.019	0.04	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L309	0	2.650	2.990	-0.054	0.019	1.017	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L183	0	2.652	2.971	-0.067	0.005	0.08	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L125	0	2.650	3.025	-0.023	0.038	1.016	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L575	0	2.662	2.987	-0.040	0.008	0.00	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L358	0	2.665	2.982	-0.050	0.003	1.020	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L262	0	2.670	2.975	-0.052	-0.005	0.71	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L571	0	2.670	2.960	-0.005	-0.015	1.024	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L315	0	2.670	3.090	0.035	0.070	1.035	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L242P	0	2.671	3.030	-0.010	0.030	1.003	90P	THICKNESS (CALIPER), MESSNER, MOTOR DRIVEN, ISO R534
L251	*	2.675	2.979	-0.040	-0.007	0.40	90W	THICKNESS (CALIPER), L + W, MOTOR DRIVEN, 20 C, 65% RH
L213	0	2.680	2.950	-0.004	-0.029	1.000	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L172	0	2.681	3.006	-0.021	0.007	1.055	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L249	0	2.682	2.967	-0.050	-0.020	0.42	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L212	0	2.690	3.050	0.010	0.029	1.000	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L128	0	2.691	2.990	-0.027	-0.011	0.72	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L339	0	2.698	2.990	-0.022	-0.017	1.004	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L305	0	2.700	3.060	0.032	0.028	1.014	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L190C	*	2.700	2.910	-0.001	-0.071	1.050	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L228	0	2.700	2.990	-0.021	-0.018	1.022	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L576	0	2.701	3.103	0.005	0.050	2.055	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L166	0	2.703	2.960	-0.041	-0.040	1.014	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L118	0	2.705	3.028	0.011	0.003	0.02	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L328	0	2.711	3.021	0.010	-0.006	1.019	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L182	0	2.715	3.002	-0.002	-0.021	1.003	90L	THICKNESS (CALIPER), L + W, MOTOR DRIVEN
L557	0	2.715	2.945	-0.045	-0.059	1.031	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L567	0	2.717	3.057	0.041	0.013	0.02	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L556	0	2.718	3.117	0.007	0.052	0.70	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L324	0	2.720	3.055	0.041	0.010	0.09	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L159	0	2.720	3.072	0.034	0.021	0.09	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L261	0	2.722	3.034	0.027	-0.006	0.94	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L484	*	2.724	2.984	-0.009	-0.040	0.08	90L	THICKNESS (CALIPER), SCHÖPPER, HAND DRIVEN
L122	0	2.727	3.034	0.030	-0.009	1.050	90V	THICKNESS (CALIPER), TMI, MOTOR DRIVEN, DIGITIZED
L105	0	2.732	3.046	0.043	-0.005	0.00	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L2420	0	2.742	3.073	0.070	0.005	0.70	90U	THICKNESS (CALIPER), MESSNER, MOTOR DRIVEN, BS3983
L352	0	2.743	3.036	0.042	-0.020	0.00	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L260	0	2.744	3.022	0.052	-0.030	0.05	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L326	0	2.748	3.051	0.057	-0.014	0.01	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L259	0	2.751	3.093	0.090	0.011	0.02	90Q	THICKNESS (CALIPER), EMVECO, MOTOR DRIVEN
L581	0	2.755	3.115	0.110	0.023	0.92	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L684	*	2.760	3.030	0.049	-0.037	1.020	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L563	*	2.760	3.050	0.004	-0.024	1.041	90U	THICKNESS (CALIPER), TMI, HAND DRIVEN
L713	0	2.760	3.060	0.071	-0.017	0.01	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L241	0	2.780	3.095	0.111	-0.009	1.050	90T	THICKNESS (CALIPER), TMI, MOTOR DRIVEN
L185	*	2.780	3.140	0.145	0.020	1.010	90B	THICKNESS (CALIPER), AMTHER, HAND DRIVEN
L106	*	2.780	2.990	0.052	-0.078	1.008	90C	THICKNESS (CALIPER), CADY, HAND DRIVEN

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T90-1 TABLE 2
THICKNESS (CALIPER), THOUSANDTHS OF AN INCH
TAPPI OFFICIAL TEST METHOD T411 08-76

SEPTEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J82	J22	MAJOR	MINOR	MAJOR	VAR			
L360	X	2.780	2.965	.017	-.0099	.005	90T	THICKNESS (CALIPER), TMI,	METER	DRIVEN
L233	0	2.797	3.124	.144	-.0003	1.001	90Q	THICKNESS (CALIPER), EMVECO,	METER	DRIVEN
L291	0	2.801	3.156	.171	.0015	.070	90T	THICKNESS (CALIPER), TMI,	METER	DRIVEN
L203C	0	2.805	3.050	.094	-.0058	1.025	90T	THICKNESS (CALIPER), TMI,	METER	DRIVEN
L323	0	2.805	3.159	.170	.0014	1.025	90T	THICKNESS (CALIPER), TMI,	METER	DRIVEN
L341	0	2.806	3.128	.155	-.0007	.059	90T	THICKNESS (CALIPER), TMI,	METER	DRIVEN
L153	0	2.830	3.153	.180	-.0009	1.011	90T	THICKNESS (CALIPER), TMI,	METER	DRIVEN
L442	0	2.837	3.148	.180	-.0017	.057	90V	THICKNESS (CALIPER), TMI,	METER	DRIVEN, DIGITIZED
L285	+	2.848	3.128	.131	-.0039	1.048	90X	THICKNESS (CALIPER): GIVE INSTR. MAKE MODEL. () METER, () HAND		
L382	0	2.863	3.142	.201	-.0041	.055	90T	THICKNESS (CALIPER), TMI,	METER	DRIVEN
L123F	0	2.875	3.195	.249	-.0015	1.053	90F	THICKNESS (CALIPER), FEDERAL,	METER	DRIVEN
L108	+	2.895	3.005	.119	-.0055	.073	90C	THICKNESS (CALIPER), CARY,	HAND	DRIVEN
GMEANS:		2.700	3.018			1.000				
		95% ELLIPSE:		.200	.071			WITH GAMMA = 48 DEGREES		

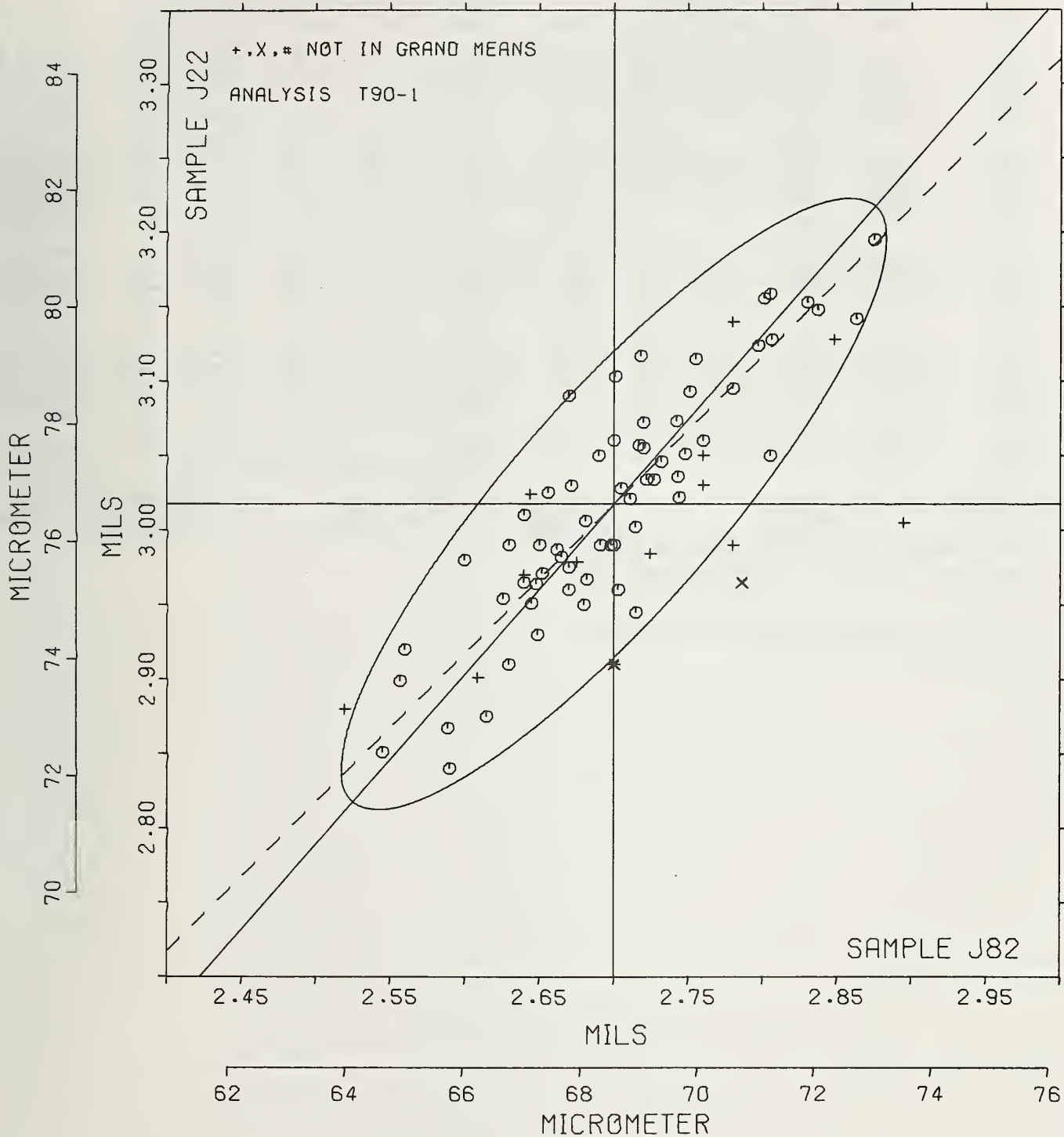
THICKNESS (CALIPER)

SAMPLE J82 = 2.70 MILS

SAMPLE J22 = 3.02 MILS

SAMPLE J82 = 68.6 MICRØMETER

SAMPLE J22 = 76.6 MICRØMETER



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS 195-1 TABLE 1
GRAMMAGE (MASS PER UNIT AREA)
TAPPI OFFICIAL TEST METHOD T410 GS-79

SEPTEMBER 1979

LAB CODE	SAMPLE D37 MEAN	RAG BOND				SAMPLE D36 MEAN	COATED OFFSET BUCK				TEST D ₀ = 10		
		61 GRAMS PER SQUARE METER	NO DEV	SDR	R ₀ SDR		75 GRAMS PER SQUARE METER	DEV	NO DEV	SDR	R ₀ SDR	VAR	F LAB
L121	62.03	1.17	1.01	0.37	0.53	77.91	0.92	1.50	0.56	1.30	95B	Ø	L121
L162	60.59	-0.27	-0.41	1.87	2.73	77.70	0.71	1.16	0.60	0.00	95K	Ø	L162
L213	60.62	-0.23	-0.30	1.00	1.55	76.71	-0.27	-0.44	0.27	0.64	95F	Ø	L213
L233	60.77	-0.09	-0.14	0.73	1.06	77.00	0.01	0.02	0.86	2.00	95T	Ø	L233
L244	59.75	-1.11	-1.70	1.20	1.76	76.40	-0.59	-0.95	0.89	2.08	95T	Ø	L244
L249	61.90	1.04	1.01	1.17	1.71	77.02	0.03	0.06	0.17	0.39	95I	Ø	L249
L280	60.38	-0.48	-0.75	0.29	0.42	77.52	0.53	0.87	0.34	0.80	95T	Ø	L280
L285	59.97	-0.89	-1.37	0.21	0.30	76.20	-0.79	-1.27	0.30	0.70	95T	Ø	L285
L305	60.45	-0.41	-0.03	0.37	0.54	77.11	0.12	0.20	0.31	0.72	95T	Ø	L305
L339	61.30	0.44	0.00	0.42	0.62	77.05	0.06	0.10	0.37	0.86	95T	Ø	L339
L344	61.31	0.45	0.09	0.13	0.19	78.12	1.14	1.85	0.28	0.64	95T	Ø	L344
L442	61.38	0.52	0.01	0.53	0.77	77.49	0.50	0.82	0.26	0.60	95A	Ø	L442
L557	61.57	0.71	1.09	1.40	2.04	76.94	-0.04	-0.07	0.60	1.41	95D	Ø	L557
L564	61.00	0.14	0.22	0.82	1.19	77.40	0.41	0.67	0.84	1.96	95E	Ø	L564
L567	61.56	0.70	1.00	1.03	1.51	77.36	0.37	0.61	0.41	0.96	95E	Ø	L567
L571	60.27	-0.59	-0.90	0.38	0.56	76.01	-0.98	-1.58	0.56	1.31	95P	Ø	L571
L574	60.46	-0.39	-0.00	0.33	0.48	76.80	-0.18	-0.30	0.39	0.91	95D	Ø	L574
L597	60.91	0.03	0.00	0.39	0.57	75.91	-1.07	-1.74	0.51	1.20	95C	Ø	L597
L604	36.19	-24.60	-38.00	0.32	0.46	45.95	-31.04	-50.31	0.28	0.64	95T	#	L604
L616	59.97	-0.89	-1.37	0.30	0.55	76.30	-0.68	-1.11	0.36	0.83	95T	Ø	L616
L626	60.95	0.09	0.14	0.02	0.91	76.74	-0.25	-0.40	0.30	0.70	95E	Ø	L626
L704	61.04	0.13	0.20	0.31	0.45	NO DATA REPORTED FOR SAMPLE D36					95T	N	L704

GR₀ MEAN = 60.86 G/SQ.METER

GRAND MEAN = 76.99 G/SQ.METER

TEST DETERMINATIONS = 10

SD MEANS = 0.65 G/SQ.METER

SD OF MEANS = 0.62 G/SQ.METER

20 LABS IN GRAND MEANS

AVERAGE SDR = 0.60 G/SQ.METER

AVERAGE SDR = 0.43 G/SQ.METER

TOTAL NUMBER OF LABORATORIES REPORTING = 22

Best values: D37 60.9 ± 1.1 grams per square meter

D36 77.0 ± 1.0 grams per square meter

Data from the following laboratories appear to be off
by a multiplicative factor: 604.

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T95-1 TABLE 2
GRAMMAGE (MASS PER UNIT AREA)
TAPPI OFFICIAL TEST METHOD T410 GS-79

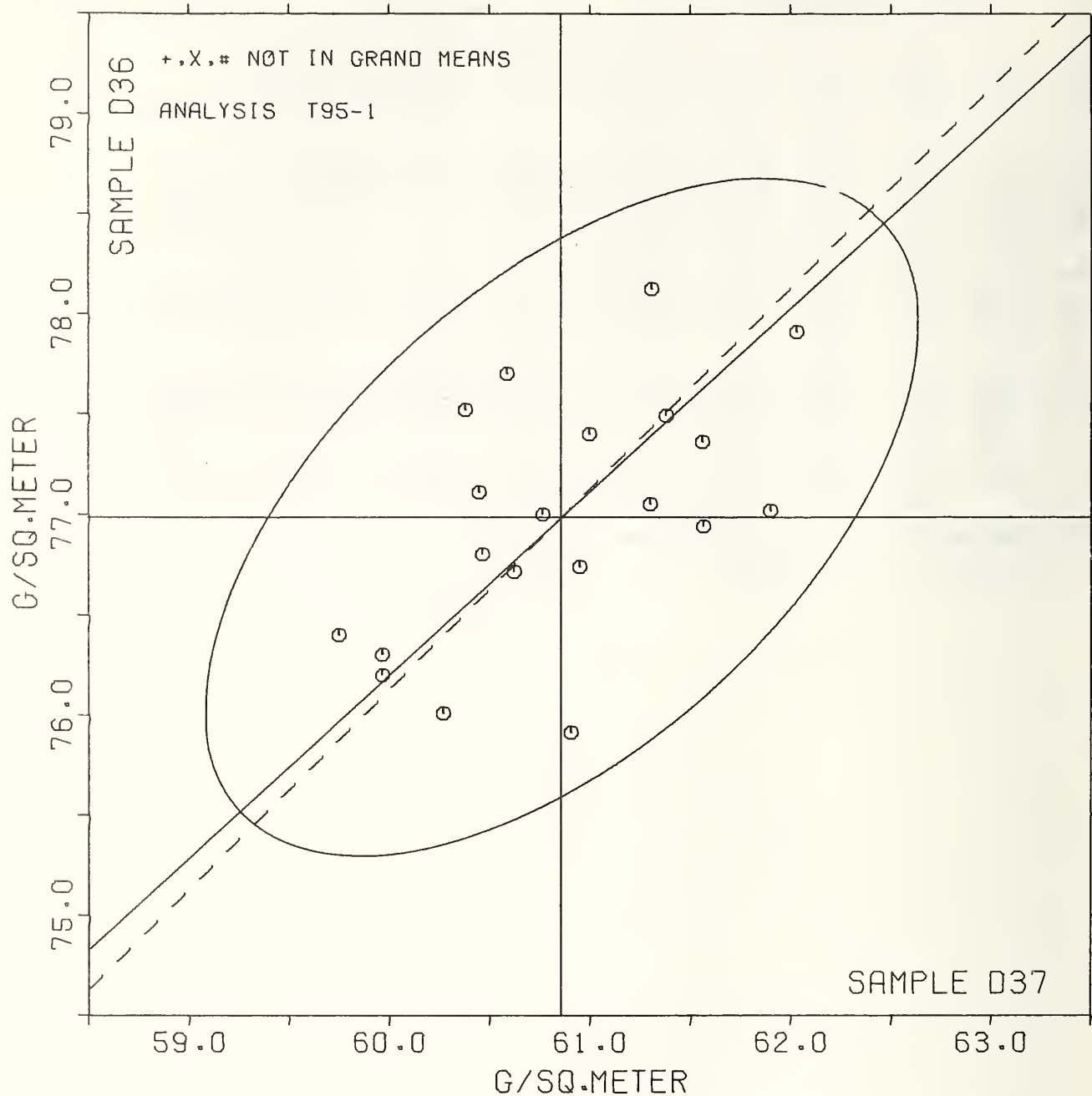
SEPTEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		E37	D36	MAJOR	MINOR	NO.	VAR	
L604	#	36.19	45.95	-39.14	-0.26	0.55	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L244	#	59.75	76.40	-1.21	0.31	1.62	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L616	#	59.97	76.30	-1.12	0.10	0.69	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L245	#	59.97	76.20	-1.13	0.02	0.50	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L571	#	60.27	76.01	-1.09	-0.32	0.93	95P	BASIS WEIGHT (GRAMMAGE), PRODUCTION REAM CUTTER
L280	#	60.38	77.52	0.01	0.72	0.01	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L305	#	60.45	77.11	-0.22	0.37	0.03	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L574	#	60.46	76.80	-0.41	0.13	0.70	95D	BASIS WEIGHT (GRAMMAGE), DIE CUT
L162	#	60.59	77.70	0.29	0.71	1.05	95A	BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED
L213	#	60.62	76.71	-0.33	-0.04	1.09	95P	BASIS WEIGHT (GRAMMAGE), FOUR-SQUARE CUTTER
L233	#	60.77	77.00	-0.06	0.07	1.05	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L597	#	60.91	75.91	-0.09	-0.62	0.08	95C	BASIS WEIGHT (GRAMMAGE), CUTTING BOARD
L626	#	60.95	76.74	-0.10	-0.24	0.00	95E	BASIS WEIGHT (GRAMMAGE), GUILLIOTINE TYPE CUTTER
L564	#	61.00	77.40	0.39	0.21	1.08	95E	BASIS WEIGHT (GRAMMAGE), GUILLIOTINE TYPE CUTTER
L704	#	61.04				0.45	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L339	#	61.30	77.05	0.37	-0.25	0.74	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L344	#	61.31	78.12	1.10	0.54	0.42	95T	BASIS WEIGHT (GRAMMAGE), TEMPLATE CUT
L442	#	61.38	77.49	0.73	0.02	0.05	95A	BASIS WEIGHT (GRAMMAGE), WEIGHED AS RECEIVED
L567	#	61.56	77.36	0.77	-0.20	1.02	95E	BASIS WEIGHT (GRAMMAGE), GUILLIOTINE TYPE CUTTER
L557	#	61.57	76.94	0.49	-0.51	1.07	95D	BASIS WEIGHT (GRAMMAGE), DIE CUT
L249	#	61.90	77.32	0.79	-0.68	1.05	95I	BASIS WEIGHT (GRAMMAGE), INGENT® PAPER CUTTER
L121	#	62.03	77.91	1.49	-0.11	0.52	95A	BASIS WEIGHT (GRAMMAGE), CENCEFA CUTTER
GMEANS:		60.86	76.99			1.00		
		95% ELLIPSE:		2.17	1.14	W44A	GAMMA = 42 DEGREES	

GRAMMAGE (MASS PER UNIT AREA)

SAMPLE D37 = 60.9 G/SQ.METER

SAMPLE D36 = 77.0 G/SQ.METER



SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
AIR RESISTANCE, GURLEY T40-1 GURLEY UNITS	A01 K22	21.9 45.4	1.7 2.6	2.8 3.1	10	59	62	10	2.5 2.7	4.6 7.2
AIR RESISTANCE, SHEFFIELD T40-2 SHEFF. UNITS	A01 K22	134.2 75.1	10.1 7.6	13.0 5.0	10	34	42	10	11.4 4.4	28.1 21.0
AIR RESISTANCE, GURLEY HG FLUTATION T41-1 SEC/10 CC	D06 G11	164. 271.	13. 41.	16. 83.	10	12	14	10	14. 72.	36. 115.
SMOOTHNESS, PARKER PRINISUMF T44-1 MICRONS	J74 K40	4.36 5.59	.42 .45	.16 .16	10	7	7	10	.14 .14	1.16 1.34
SMOOTHNESS, SHEFFIELD T45-1 SHEFF. UNITS	J74 K40	80.9 167.4	5.5 7.5	5.1 9.3	15	82	89	10	4.5 8.2	15.5 22.4
SMOOTHNESS, BEKE T45-2 BEKE SECONDS	J74 K40	83.7 27.1	3.8 2.2	7.6 2.8	15	8	11	5	9.5 3.5	13.0 6.8
SMOOTHNESS, BENDTSEN T47-1 ML/MIN	J74 K40	96.6 223.9	9.5 15.7	8.4 23.4	10	8	8	10	7.4 20.5	27.3 43.6
MOISTURE T53-1 PERCENT	G09 G10	5.92 6.17	.32 .43	.08 .08	10	9	10	2	.15 .15	.91 1.35
K & N INK ABSORPTION T56-1 K & N UNITS	B80 B92	24.0 23.8	3.1 3.1	.8 .8	4	10	10	2	1.5 1.5	8.7 8.6
PH, COLD T57-1 PH UNITS	A99 J75	5.729 7.200	.114 .351	.045 .081	5	7	7	2	.089 .158	.322 1.089
PH, HOT T57-2 PH UNITS	A99 J75	5.182 7.705	.256 .163	.054 .064	5	4	6	2	.106 .125	.718 .461
OPACITY, B&L, 89% BACKING, FINE P. T60-1 PERCENT	G01 E03	95.88 89.72	.34 .43	.23 .35	10	63	79	5	.28 .44	.96 1.22
OPACITY, ELREPHO, PAPER BACKING, FINE P T60-2 PERCENT	G01 E03	94.42 92.05	.24 .25	.20 .24	10	14	19	5	.25 .30	.68 .72
OPACITY, B&L, 89% BACKING, NEWS T61-1 PERCENT	Z03 G13	53.53 81.84	.52 .63	.44 .73	10	14	16	5	.55 .90	1.48 1.85
OPACITY, B&L, 89% BACKING, TRACING T62-1 PERCENT	Z03 Z07	68.98 59.17	.94 .82	.59 .73	10	6	7	5	.73 .90	2.65 2.35
OPACITY, ELREPHO, PAPER BACKING, NEWS T61-2 PERCENT	Z03 G13	90.95 82.02	.06 .30	.21 .50	10	2	3	5		
OPACITY, ELREPHO, PAPER BACKING, TRACING T62-2 PERCENT	Z03 Z07	74.70 81.06		.18 .30	10	1	1	5		
BLUE REFLECTANCE, DIRECTIONAL T65-1 PERCENT	J98 B47	75.94 66.25	.60 1.00	.14 .33	8	28	56	5	.17 .41	1.68 2.78
BLUE REFLECTANCE, DIFFUSE, WITH TRAP T65-2 PERCENT	J98 B47	75.64 66.47	.61 .75	.11 .21	8	16	18	5	.14 .26	1.69 2.18
BLUE REFLECTANCE, DIFFUSE, NO TRAP T65-3 PERCENT	J98 B47	76.66 68.11	.47 .66	.09 .19	8	14	14	5	.11 .23	1.31 1.85
SPECULAR GLOSS, 75 DEGREE-HIGH RANGE T75-1 GLOSS UNITS	E07 E47	68.8 63.6	2.2 1.9	1.8 1.7	10	33	38	5	2.2 2.0	6.4 5.4
SPECULAR GLOSS, 75 DEGREE-LOW RANGE T76-1 GLOSS UNITS	G03 E78	37.92 6.01	1.55 .57	1.21 .30	10	16	19	5	1.50 .37	5.25 1.61
THICKNESS (CALIPER) T90-1 MILS	J82 J22	2.700 3.018	.072 .081	.039 .056	10	63	77	10	.035 .049	.200 .225
GRAMMAGE (MASS PER UNIT AREA) T95-1 G/SQ.METER	D37 D36	60.86 76.99	.65 .62	.68 .43	10	20	22	3	1.09 .69	2.02 1.80

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